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SMITHS' WORK.

BY J. H.

ORNAMENTAL WORK OF THE MIDDLE AGES.

THERE is a large quantity of ornamental work remaining from the wreck of the Middle Ages which cannot properly be classified, but which is characterised by much redundancy of detail. Locks and keys, ecclesiastical furniture, and articles of domestic use, abound. The briefest possible notice of some of these must conclude this preliminary section on mediæval work.

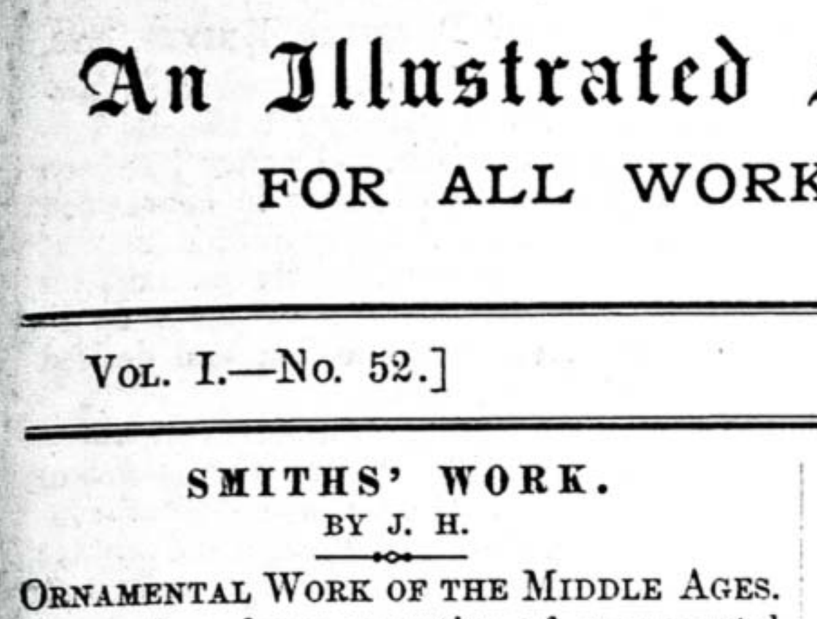

Fig. 23.

Some of the locks and keys which survive are worth careful study. The latter are for the most part filed out of the solid. Some specimens of the old French smiths, preserved in the Hôtel de Cluny, Paris, must have cost an almost incredible amount of labour. There are a good many figured in an old and very scarce book of a French smith, Mathurin Jousse, and several chapters are therein devoted to their description.

A method commonly adopted in the construction of some articles where cheapness was sought after without the sacrifice of beauty was this:—An open-work pattern was marked on sheet iron and punched out, and the edges filed square. This was laid upon another sheet, and foliations or other ornaments were marked through the interstices of No. 1 upon sheet No. 2. When No. 2 was cut out, this was laid, perhaps, upon another sheet, No. 3, which was then also marked, the operation being repeated if necessary upon several sheets in succession. These, being all perforated, were laid in relative superposition and riveted together. Sometimes beads, rosettes, or other ornaments were attached to the face. Many examples of such work occur in door-handles, locks, and escutcheons, and I may remind the reader that very pretty effects have also been produced by the twisting of bars, both of round and square section, to form door-handles and knockers.

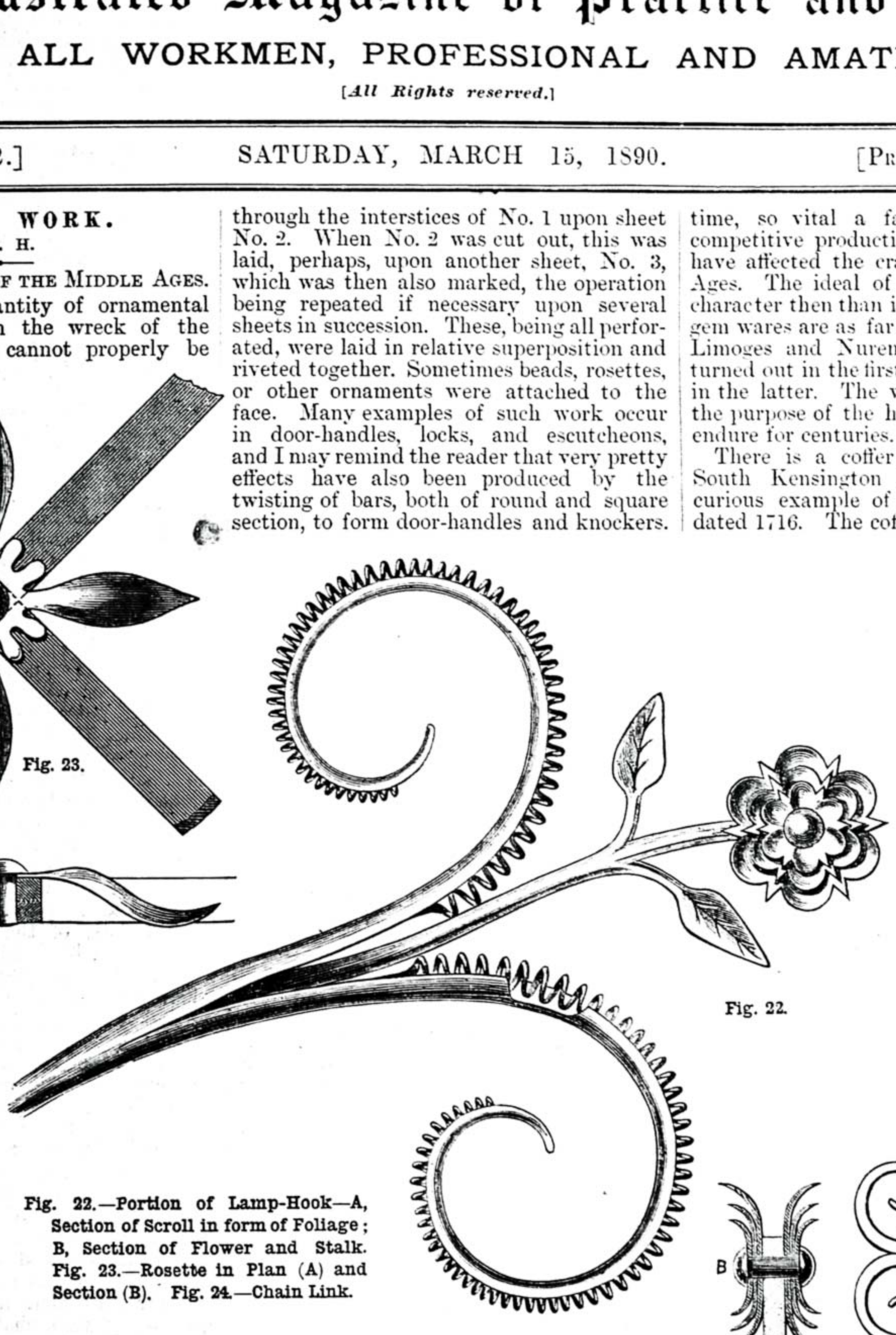

Fig. 22.

Fig. 22.—Portion of Lamp-Hook—A, Section of Scroll in form of Foliage; B, Section of Flower and Stalk. Fig. 23.—Rosette in Plan (A) and Section (B). Fig. 24.—Chain Link.

Many of these thin-plated articles would scarcely come within the range of smiths' work. There is little difficulty in their execution, being for the most part cut or stamped without any bending; yet there is in many cases a good deal of raised work combined therewith, semi-human and grotesque figures as well as foliage being beaten up with punch and hammer into full and perfect relief. And there is, besides, much engraved work which requires time. Nowhere, perhaps, does the contrast between mediæval and modern work appear in stronger contrast than in the relative amount of detail put into them. The quantity of work turned out in a given time, so vital a factor in our modern competitive production, scarcely appears to have affected the craftsmen of the Middle Ages. The ideal of work was of a loftier character then than it is now, and Brummagem wares are as far removed from those of Limoges and Nuremberg as the quantity turned out in the first exceeds that produced in the latter. The wares of the one fulfil the purpose of the hour, those of the other endure for centuries.

There is a coffer or deed-chest at the South Kensington Museum which is a curious example of German work. It is dated 1716. The coffer is made of iron, and is almost covered with elaborate repoussé and open scroll or foliated ornament. It is stiffened with straps, also highly ornamented, is provided with stout handles, and stands on handsome curved legs. But the most curious portion of the deed-chest is its lock, which is placed in the centre of the top of the cover. There are a large number of stout knobs studded over the cover which might be supposed to be for purposes simply of ornamentation. But there is just one knob near the lock, to the left hand, which must be turned and unscrewed in its hole before the keyhole can be exposed. Also another knob in front of the lock has to be pulled backwards to release a spring which presses against the cover of the lock. When these two operations are performed, then the cover of the

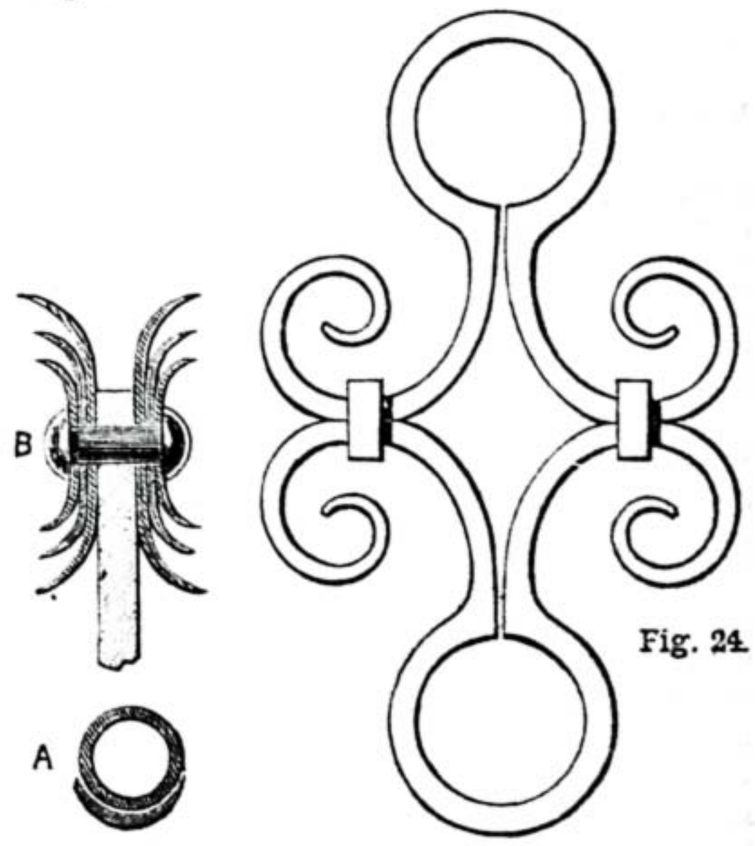

Fig. 24.

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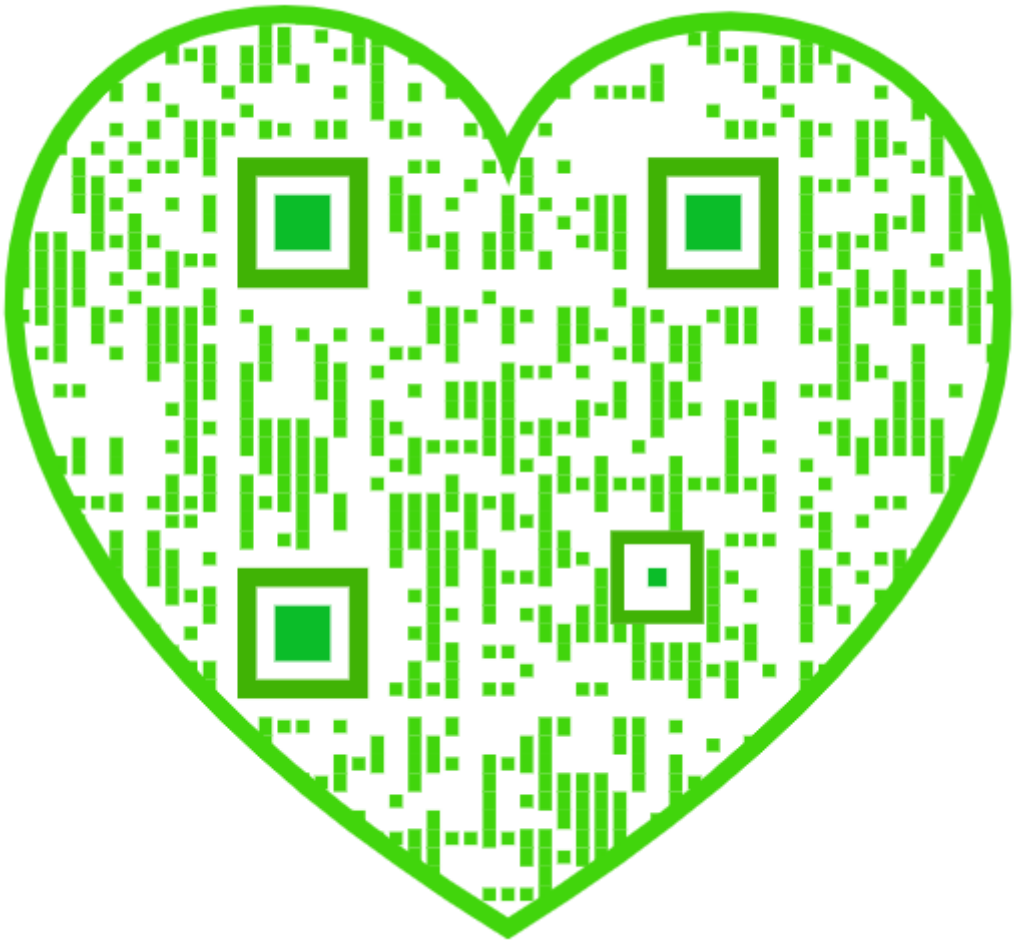

lock can be lifted and turned aside, exposing the keyhole in the bottom of its little box. It is an ingenious and interesting specimen of an early burglar-proof safe.

A somewhat unique piece of work is shown in Fig. 22. It is a portion of a lamp-hook of seventeenth-century German make. This floral ornament consists of lanceolate leaves with tendrils laying in and partly enclosed by the leaves. From the axils of the leaves the flower-stem comes out, the flower containing three whorls, and it is double, back to back (B). But the noteworthy point is the beautiful manner in which the tendrils are twisted. It appears to me as though the tendrils and leaves were swaged from a divided rod, though they may certainly also have been welded at the axil. But there is no union of the two all along the course of the leaves; one simply lies within the other (A). More than this, the convolutions diminish in diameter, and the diameter of the rod also diminishes.

Rosettes are frequently employed for the purpose of covering over unsightly joints. These are generally punched from a single piece of plate and united with a central rivet terminating in a knob in front. Fig. 23 is from an Italian trellis centre of the seventeenth century, and shows a flower concealing the union formed by the crossing of $\frac{3}{8}$-in. square rods which form the panel.

There is an implement in the South Kensington Museum of French make and sixteenth-century date, used at the ceremony of cutting a first sod. It is called a pickaxe. But it is a double-ended implement. One end is shaped like a pickaxe, the other like an adze. The blade is pierced with holes and incised with two shields, one representing a similiar instrument, and the other charged with a fleur-de-lis. On the sides of the socket for the handle are masks.

A specimen of a chain link of Venetian make of the seventeenth century is shown in Fig. 24. Each link is made of two pieces curved and united with belts. There is a hook at top, then five successive links like the figure, then a large expansion of a different pattern, afterwards six more links and another expansion terminated with a bottom hook. This was probably used for the purpose of suspending a lamp.

It does not matter how commonplace were the uses of utensils, they were nevertheless wrought into beautiful forms, and decorated profusely with ornament. Stands for braziers are treated thus; hammers, carpenters' braces, pincers, nutcrackers, corkscrews, laundress's flat-irons, andirons, and many other articles commonly reputed base and vulgar, are made beautifully artistic.

Much of the art work of the Middle Ages is lost to us, having been destroyed by change, cupidity, revolution, and various political events. It may be safely averred that in the most favoured lands more has been destroyed than preserved. France has especially suffered, thousands of monuments which have been described and figured having been swept utterly away.

We cannot properly comprehend how much is involved in the mediæval smith's work, except by a broad study of the whole artistic craft of the Middle Ages. Abundant examples occur of men who were workers in gold, silver, and iron—canons of cathedrals ("artist canons," as they are termed)—men who wrought for the love of Mother Church, and remained poor at the same time that they enriched her churches and shrines with works of marvellous beauty. The smith's work was only a single branch of that art which was offered as a tribute to faith. Months and even years of loving labour were often bestowed upon a single article, and the names of very many of the artist craftsmen survive after the lapse of ages and revolutions. Need we wonder that the baser metal, iron, was wrought into such wondrous forms when we know how the same artists had wrought or cast still more delicate forms in the precious metals, or had been intimately associated with those who had fashioned the candelabra, lecterns, chalices, monstrances, reliquaries, and so forth, employed in the service of the great Church?

It is said that the church of St. Sophia at Constantinople possessed at one time no less than 6,000 gold candlesticks, two of which weighed 100 lbs. each; twenty-four copies of the Evangelists with golden covers, each weighing two quintals; and seven massive gold crosses of one quintal each.

Eloi in France, 588—659, was, like Dunstan in England, first a goldsmith, then courtier, minister, bishop, and saint. He founded two establishments for the education of artist canons, a class of men common in the cathedral establishments about the tenth century. It is related that Geoffrey de Champallement, Bishop of Auxerre, instituted three prebends in his cathedral for artist canons. One of these was to be a goldsmith, the others a painter and a stained-glass worker. Many of the monastic orders made it their boast to encourage the liberal arts. The cathedral and monastery were thus nursing mothers to the arts in a turbulent age. St. Dunstan, 925—988, who was monk, goldsmith, blacksmith, and royal minister, is an illustration of the union of craftsmanship with learning.

"Up to the middle of the sixteenth century," says Wyatt, "the artist and the workman had been one and the same, and alike honoured, hence much of the rare old excellence. After that period the artist became a patrician who designed, the workman a plebeian who executed. Hence at once arose an estrangement, which gradually widened until the artist made all his designs after some vague general model of a *beau ideal*, and the workman, having only his assistance on rare occasions, dropped into a jog-trot habit of collecting stock commonplaces, which at last degenerated into a system of mannerism and copying, taking the place of design altogether, and raising up a formidable barrier to all modern progress in the industrial arts."

A treatise on iron work, the first of its kind, was published in 1627 by one Mathurin Jousse. It treated of tools, of which he enumerates thirty varieties, and of processes in detail. He gives a description of locks, some of which he says took two years to make; the making of padlocks and of keys, the union of iron by melted brass, and of silver and brass (silver solder), the making of bellows, screws for vices, files, the tempering of steel, and much besides. There are sixty-nine chapters in all. Some of the woodcuts in this work are extremely quaint.

The ornamental section of smiths' work might well appropriate a much larger share of attention than I have been able to give to it; but forming as it does only a portion of a series having a much wider range, I now leave it to enter on at some future time the treatment of the modern practice of smiths' work. This will deal with practical work in the forge with hammer, anvil, and gauge, and with boiler making.

PLAIN AND DECORATIVE HOUSE PAINTING.

BY A LONDON DECORATOR.

HOUSE-PAINTERS' BRUSHES, KNIVES, ETC.

THROUGHOUT a varied and extensive knowledge of the house-painting trade, its employers and operatives, the writer has been much impressed by one fact in connection therewith—namely, the very limited amount of knowledge possessed by the average individual, whether master or man, as to the nature, right construction, and desired qualities of their brushes.

Without engaging ourselves with a lengthy disputation upon the political economy of the trade, a few moments' consideration will show the great disadvantage attending this lack of knowledge, as well as the cause of it also.

In no other branch of trade is it usual for the employer to supply the artisan with tools, and no custom, I believe, has been more harmful to the independence and self-respect of operative house painters as a body than this "handing over" and "receiving back" the tools with which a worker earns his daily bread every time he obtains a fresh job. Good brushes are as indispensable to the house painter as are reliable and well-tempered tools to the joiner or cabinet maker. Where, then, comes in the wisdom of such an arrangement, which, if adopted by a master worker in wood, without doubt would be considered both absurd and impracticable?

Such, however, is the case. The master-painter, or his *clerk*, or *manager*, and sometimes, but not *very* often, his practical foreman—since the latter would probably purchase good brushes, which are, naturally, *not* the cheapest—select the articles with which a season's work will be executed; and, in nine cases out of ten, they will be the *cheapest* of the "A 1," "Superfine," "Extra strong," or some such similar lying appellation the vendor or traveller pleases to term them. I do not assert this as being characteristic of the trade anywhere and everywhere; but such, undoubtedly, is the case in the provinces and small towns, where the *spreading* of paint is the most important factor of the trade's existence.

The immediate purpose of this paper, however, is not to consider the circumstance and customs attending the purchase and use of house-painters' brushes, but to describe the particular kinds with which the painter has to work, and to further afford herein some measure of advice as to price and quality for the guidance of purchasers.

The *best bristles* used in making painters' brushes are imported from Russia. The hairs of the hog and wild boar are noted for their strength and size, growing from two and three to some nine inches long. St. Petersburg, Kamschatka, and the "wilds of Siberia" contribute a large proportion of the immense quantity used for brush making annually. The quadrupeds "shed," or rub off, a goodly number of their bristles during the summer time, and these, when collected into a sufficiently large bundle, are sent by the peasantry from all parts of the country to such trade centres as those above mentioned. France and Belgium also contribute a small proportion of bristles to the market, and Germany not only sends us the hair, but a great quantity of the cheap and "rubbishy" brushes I have alluded to.

The *value* of *hogs' bristles* naturally depends upon their suitability for brush making—their length, strength, elasticity,

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and also colour. Not only is it so with house painters, but also with all descriptions of brushes, *white* bristles are commonly preferred; probably under the impression that adulteration therewith is less prevalent than with grey or black-haired brushes. Bristles are quoted on the market at "per cwt.," and the vast difference which may be found in the price and quality of two ordinary-looking paint brushes may be gathered from the fact that the price of genuine bristles ranges from about £10 to nearly £50 per cwt.

With the growing demands and requirements of the painting and decorative trades, the supply of the best and most serviceable bristles and brushes scarcely keeps pace; hence the industrious German trader finds a splendid market here for the showy-looking goods with which the trade is now inundated.

The *adulteration* of brushes is carried on to a vast extent, and principally by the aid of American fibre and horsehair. So well are these articles manipulated and mixed with the bristles that a thoroughly practised and practical person alone can discover them. Of the two, the horsehair is most difficult to detect by examination, since the difference between that and poor bristles is but one of a little elasticity. When there is, however, any quantity of fibre mixed with the hair the loss of "spring" in the brush is very noticeable. The appearance of the fibre is also more open to question; it is neither so smooth and finished-looking as hair; whilst the difference in burning of a vegetable fibre, which will leave a grey ash, and the peculiar smell attending the burning of hair or bristle, quickly decides for us its nature. This, however, is no test between bristle and horsehair—experience alone can decide the latter.

The *principal brush-making firms* of London, and those whom any reader of WORK (employer, operative, or amateur) can apply to with the certainty of getting genuine brushes of superior quality—providing he pays a fair market price for them—are Messrs. G. B. Kent & Co., of Great Marlborough Street, London, W. (whose goods I place before any makers for excellence); Messrs. Crowden and Garrod, of the Borough, Southwark; and Messrs. Hamilton & Co., of Greek Street, Soho, London.

In arranging the accompanying illustration of this subject, my aim has been chiefly to impress by its assistance the peculiarities of each class or make of brush upon the memory of the reader, and this without any consideration of the exact size or scale. Figs. 1 to 10 include most of the descriptions of brushes in ordinary use for painting and varnishing, and all these the earnest worker should be familiar with. The first figure will convey a fair idea of the appearance of a "good honest paint brush" in the form it is purchased in. The bristles are about 6 in. long from the binding to the point, and each brush requires tying up with string some two or three inches higher before it is used for painting with. As the brush wears down the string binding is untied, until eventually the extra "bridle" is entirely dispensed with. Fig. 2 is a similar article, but, as its name implies, made in an oval shape; and upon these lines the brush is worked. Fig. 3 represents a make of brush much used in the provinces, and in which shape quantities of cheap brushes are made. All three above mentioned are usually sold in four qualities of bristle, "Lily," "Yellow Middle," "Grey," and "Black," of which the first and whitest is the best and most expensive. The prices of each for the full size article would be about 5s. and 4s. 6d. for the first two qualities, and about 4s. for the last two, respectively. Although good hair makes a good brush in all of them, the first I believe to be the best in the hands of a thorough tradesman; and this shape is mostly used at the West End decorators' shops.

Fig. 4 shows an English paint *tool*, a small, round-handle brush, the shape of which is never altered; the small sizes are called "sash tools"—that is, for painting the small bars of a window-sash. They all require tying up shorter for using in oil paint, and the price of a good medium size tool is from 1s. to 1s. 6d. The German paint tool (Fig. 5), both for wear and quality, compares very unfavourably with the former; and although they can be bought so low as 50 per cent. less than a good English tool, they are dear at that to any worker who buys a brush to use and keep, and not to spoil. Fig. 6 represents a tool of recent date, purposely made for sash-cutting, at prices from 1s. to 1s. 6d. each; it is an assistance to quick and clean sash-painting on factory premises, etc., where there are great numbers of window-panes, but for ordinary work the string-tied sash tool will suffice. Figs. 7 and 8 are usually termed "fitches," consisting of short bristles bound in tin, with long red handles. They cost from 2d. to 2s. each, according to size, and are much used for all kinds of decorating and gilding; and nearly all workers in paint, "artistic and otherwise," find them indispensable. Fig. 9 is a somewhat similar brush, useful to gilders, scene painters, etc., as well as decorators.

Painters' Varnish Brushes are usually old and well-tried tools that have been "worn-in" with painting, and these cannot be improved upon for professional use if properly cleaned and looked after. Figs. 10, 11, and 12, represent brushes specially made for varnishing; the first, shown edgewise, it will be noticed is ground down to the shape of a partly-worn paint brush, and costs from 2s. to 4s. Fig. 11 is a shape one occasionally sees used by the operative house painter; why this shape was purchased for *his* work I suppose nobody—not even the employer who purchased it—could say; certainly not by reason of its suitability. This and Fig. 12 can only be used to advantage on the finest work, and on broad, flat surfaces; and, as before said, nothing can touch a "good old paint brush and tool" for house-painters' varnishing purposes.

Dusting Brushes are such as no clean and good work can be done without. Fig. 13 shows the best shape of brush for this purpose, at prices from 4s. to 5s. each. Somewhat similar in shape to Fig. 1, it is yet rather larger, and the bristles are much longer and spreading, so that dust and dirt can be brushed out of any crevice and corner with ease. I have seen brushes like Fig. 3, made only for painting, repeatedly used for this purpose, and when by such unfair knocking and usage the hairs come out, the maker is often blamed without reason.

Figs. 14 and 15 are more decorators' than painters' brushes. The first is used for stencilling, and the latter for running lines with the aid of a bevelled edge straight-edge. The prices of these tools, like all brushes, depend upon the size, but a useful brush of either kind can be bought for 6d.

From 16 to 20 we have a variety of larger brushes specially made for distemper painting and preparation. Fig. 16 is the distemper brush for the best kind of work, and such as is used in London and the chief decorative centres. They are also known as "two-knot stock brushes." The best and finest are made with yellow and grey bristles, which are about 6 in. long, and cost from 6s. to 9s. each, according to size. They are without doubt the most suitable size and shape for spreading properly prepared "jellied" distemper. Fig. 17 represents a most useful brush, made of black hair and fibre, for washing off old distemper from ceilings and walls, the prices of which are from about 3s. to 4s. 6d. each. Fig. 18 shows the distemper brush very general in the west of England and other provincial parts, where it is commonly known as a "paddle" brush. Its broad, thin make tells plainly how little jellied distemper is understood and used in parts where the "paddle" is called for, since nothing but a wash can be spread with them. They are always made with grey or black hair, and cost from 4s. to 6s. each. Fig. 20 is a good shape and make for a practical man, but rather too heavy and clumsy for the best work; the price of this corresponds with the preceding brush. The four kinds just described are always made with handles, as shown; Fig. 19, however, corresponds closely with Fig. 18, but is made for affixing a long handle thereto.

In some parts of the country this "limer" is the principal ceiling brush used—I need scarcely add that in such quarters decorative art has not reached a very elevated position. A practised hand can get over a tremendous quantity of sizing and distemper washing with them, and they save erecting the scaffold also. They are, if of the best kind, as expensive as the "ground stock," Fig. 16. Fig. 21 represents a good pasting brush, and useful for distemper work also, costing about 4s. 6d. each.

Stipplers are the most costly of painters' brushes. Fig. 22 shows one with handle at end; they are also made with handles on the back and reversible handles. They are used for obliterating the brush markings, in "flatting" and other processes, by a beating action, executed evenly and carefully after the paint is applied and roughly distributed. They require careful attention to keep in order, and should, directly after use, be washed with plenty of soap and warm water, without wetting the "stock" or wood. When all the paint is removed, rinse in cold water, and accelerate the drying by beating on a dry cloth or wash-leather. The price of a stippler 8 in. × 6 in. is about 13s.; 9 in. × 7 in., 17s.; and a small size, 6 in. × 4 in., would cost 7s. or 8s.

Paperhangers', or *Papering, Brushes* are shown at Fig. 23; these are made for fixing new paper to walls, just as a cloth is used by the novice or amateur. The shape of the back is somewhat similar to a spoke-brush—long and thin, so that the hand can grasp it comfortably. Paperhangers use such a brush for the bulk of their work; but for "satin" goods and very delicate papers the roller (Fig. 24) is substituted for the brush, and with which the paper is rolled into close contact with the wall. When newly purchased it is usual to cover a roller neatly with a couple of thicknesses of flannel.

Of the *knives* most used by the house painter, I have shown five. A represents a *chisel knife*, or it may be termed a *stopping knife* with chisel point. B shows the most useful shape of *stopping knife*, with which holes and indentations of woodwork, etc., are filled with putty. C is the "chisel knife" proper, but as often termed the *broad knife*; this is used for stripping and scraping old walls, filling up woodwork, stopping plaster walls, etc., and is a very useful tool. D and

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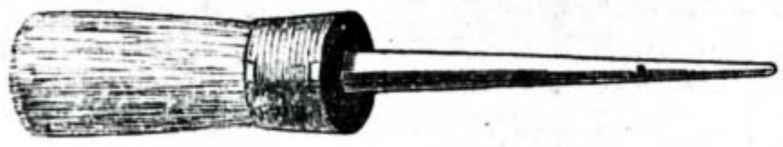


Fig. 1.

Fig. 7.

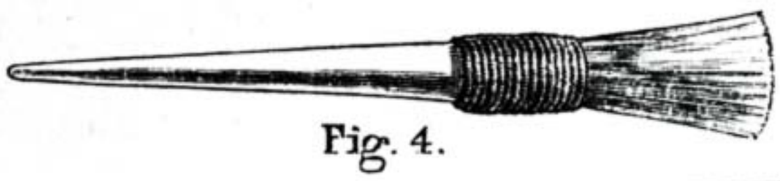
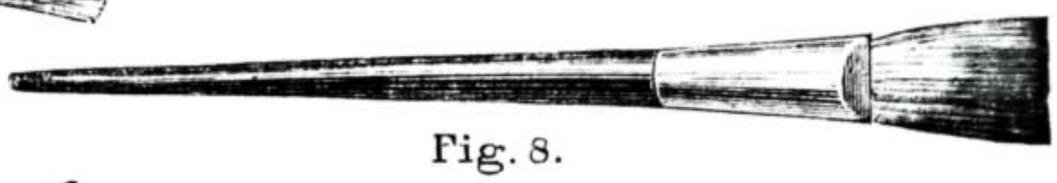


Fig. 4.

Fig. 2.



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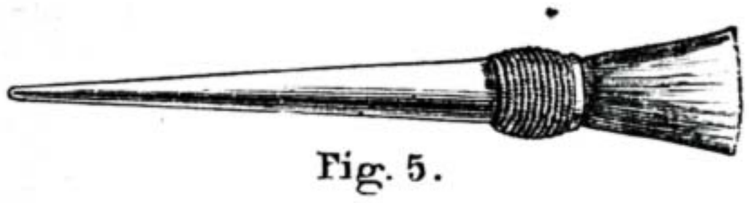

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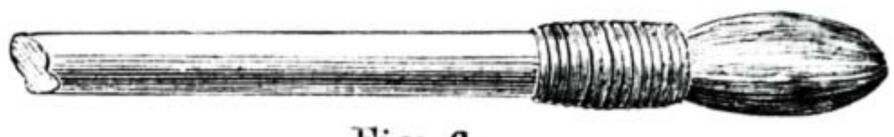


Fig. 9.

Fig. 3.

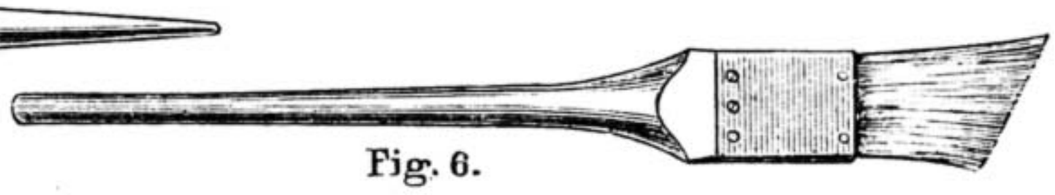


Fig. 6.

Fig. 14.

Fig. 10.

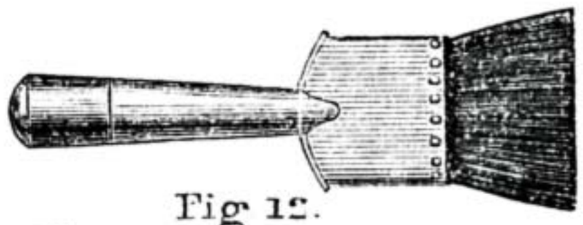
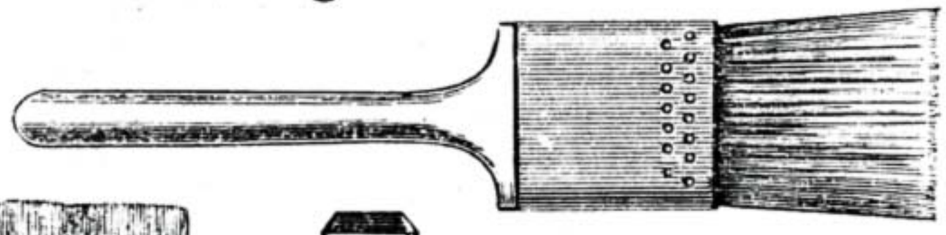


Fig 12.

Fig. 15.



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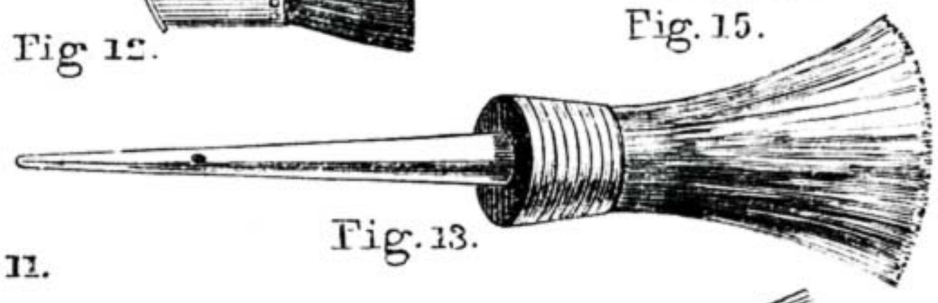


Fig. 13.

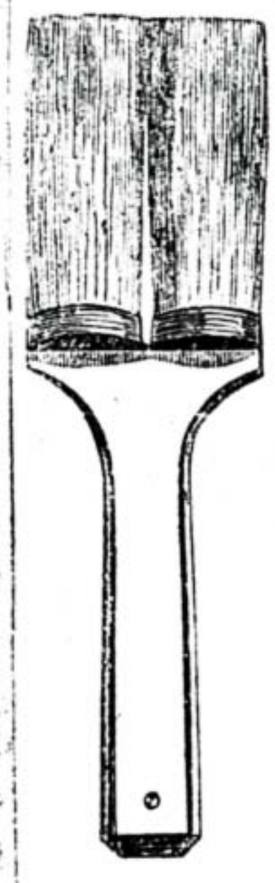


Fig. 16.

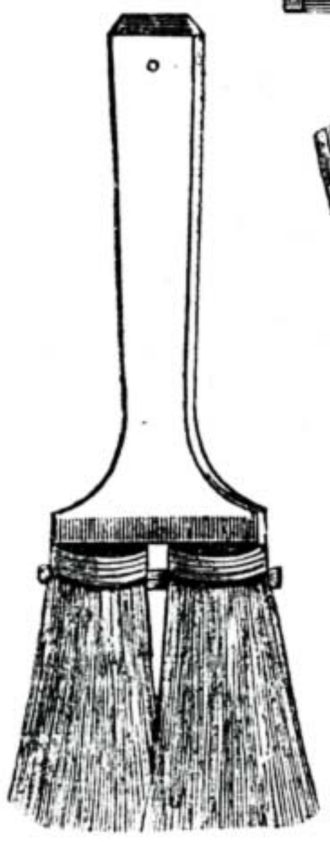
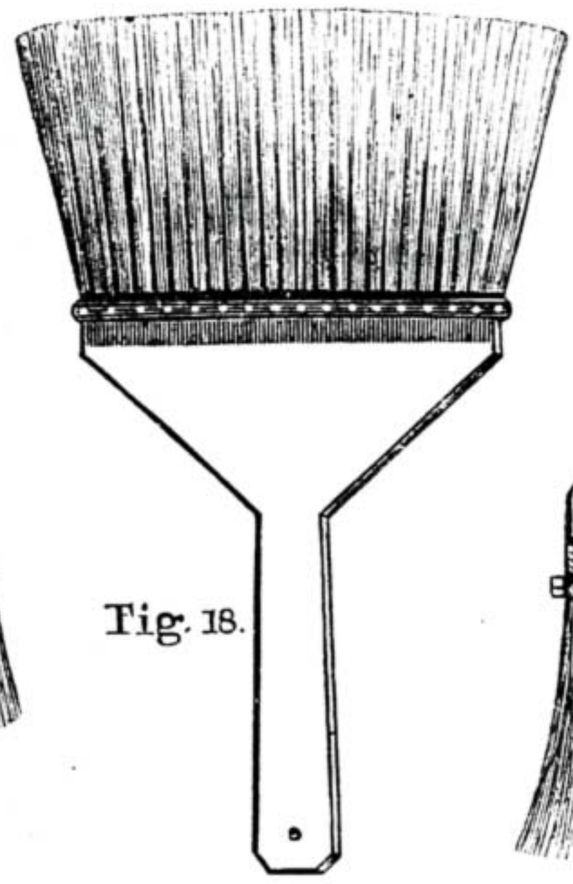


Fig. 17.



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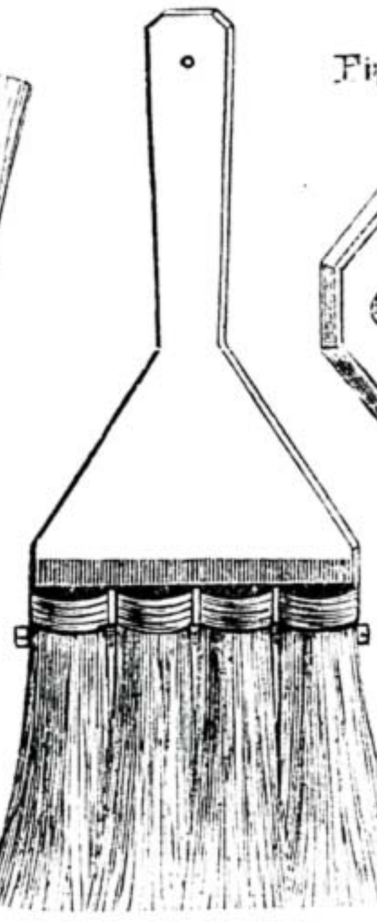


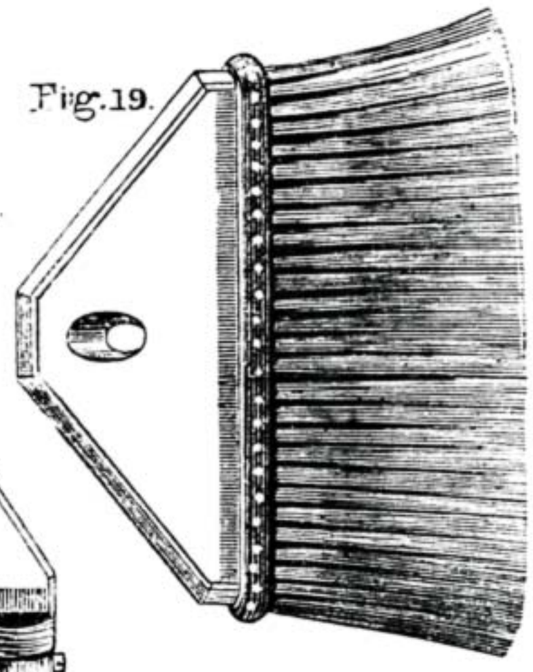


Fig. 19.

Fig. 20.

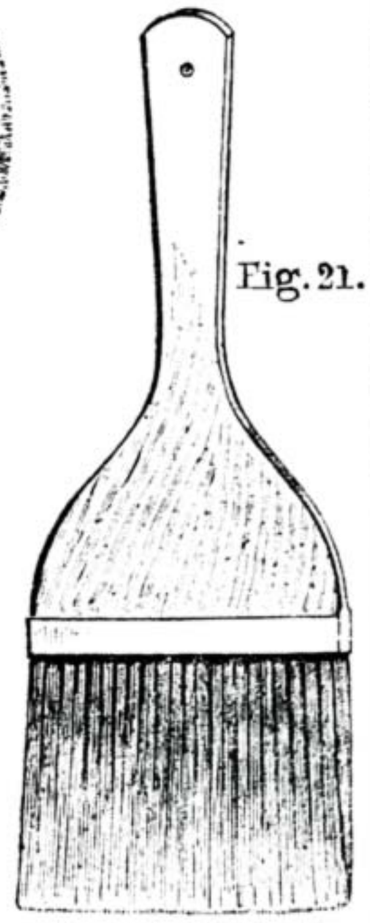
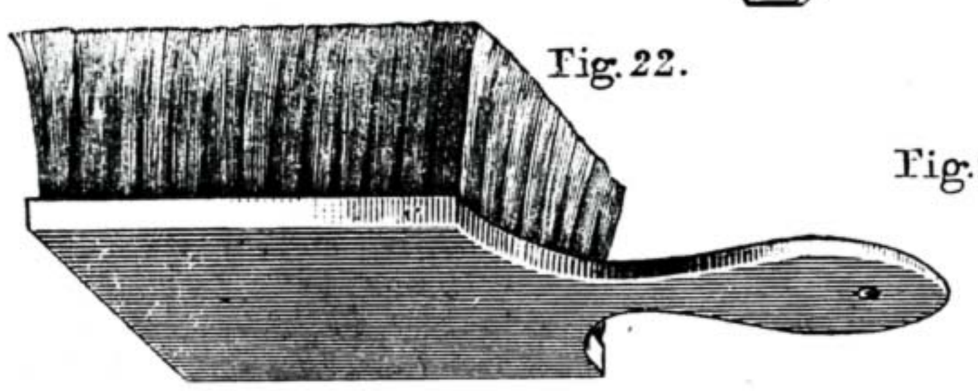


Fig. 21.



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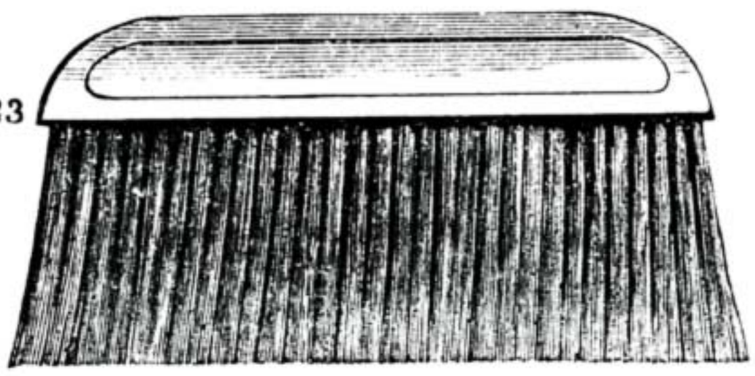


Fig. 23

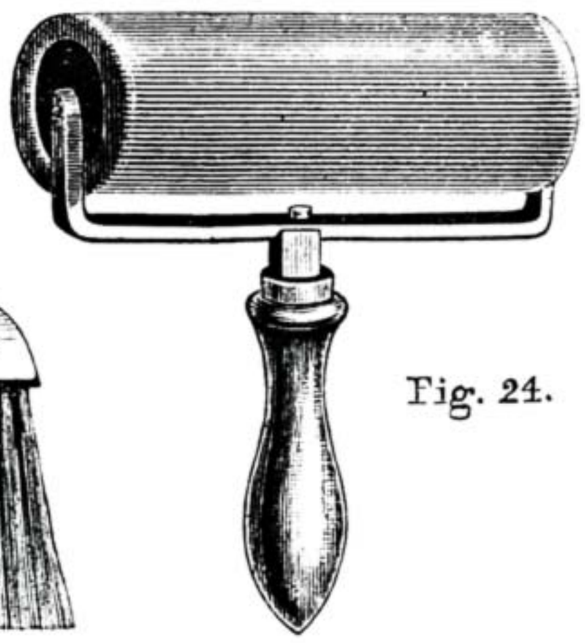
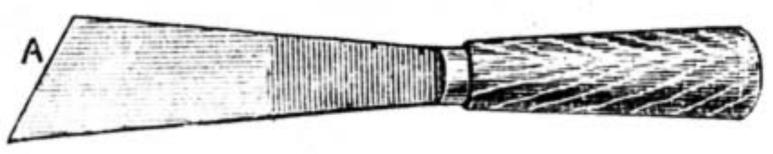


Fig. 24.



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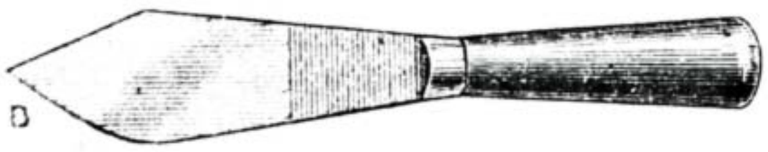

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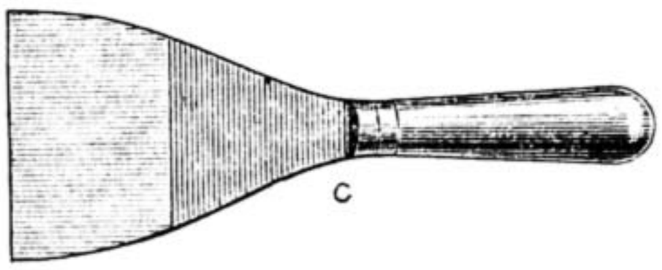

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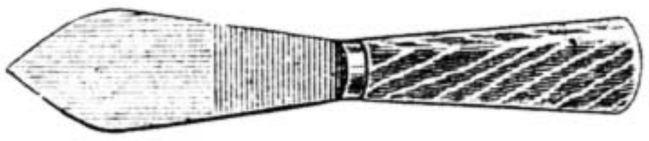

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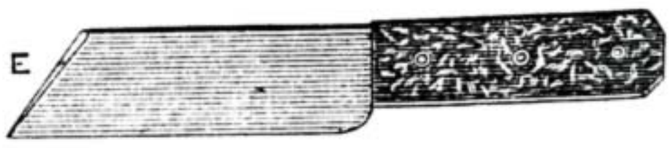

E

HOUSE-PAINTERS' BRUSHES AND KNIVES.

Fig. 1.—Ground Paint Brush. Fig. 2.—Oval Ditto. Fig. 3.—Copper Bound Ditto. Fig. 4.—Sash Tool (English). Fig. 5.—Ditto (German). Fig. 6.—Sash-Cutting Tool. Fig. 7.—Round Hog-hair Fitch or Tool in Tin. Fig. 8.—Flat Ditto. Fig. 9.—Round French Tool. Fig. 10.—Oval Bevelled Varnish Brush. Fig. 11.—Flat Ditto in Tin. Fig. 12.—Fitch Hair Ditto. Fig. 13.—Dusting Brush. Fig. 14.—Stencil Tool. Fig. 15.—Lining Fitch. Fig. 16.—Ground Distemper Brush. Fig. 17.—Washing-off Brush. Fig. 18.—Nailed Stock. Fig. 19.—Limer. Fig. 20. —Scotch Stock. Fig. 21.—Pasting Brush. Fig. 22.—Stippler. Fig. 23.—Paperhanger's Brush. Fig. 24.—Paperhanger's Roller.

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E are more properly *glaziers' knives* than house painters'; the first is the *putty knife*, indispensable for glazing sashes, and the latter, the *hacking knife*, for hammering out the old hard putty previous to reglazing. All these, with the exception of C, cost from 9d. to 1s. each; the broad knife is worth from 2s. to 3s.

Brushes are by far the most important of the painters' tools, and I have given my chief attention to them in this paper. Space does not permit of my introducing herein a number of other articles used in the trade; but where possible they will be illustrated in each lesson as they are required for practical purposes described in such. The present article closes the first and elementary part of this subject. In Vol. II. the imitation of woods, marbles, etc., will be practically taken in hand, accompanied with illustrations of tools and processes—so far as such, in "black and white," can assist the student.

A CARVED BUREAU.

BY D. ADAMSON.

DRAWERS, MOULDINGS, ETC., IN EARLY ENGLISH STYLE—CONCLUSION.

WE have still to consider the stamping of the Early English character, if one may call it so, on the drawer fronts, etc. This will be managed by beads and mouldings, or by one without the other. Let us take beading first. As no doubt every one is aware, this effective and easy way of breaking a plain flat surface is managed with a scratch or router, the blade of which is simply worked backwards and forwards on the wood till the bead is formed. A simple form of this tool and its use having been recently the subject of an article in these pages, it will be unnecessary to dilate on it here.

Two rows of beadings will be enough for each drawer front, on which they are to be scratched horizontally, only right across, at a distance of about an inch from the top and bottom. A row composed of three plain beads, as shown in Fig. 24, will be very suitable, but there is no reason why the beading should be so uniform if any other pattern be preferred. For instance, any of those illustrated in the article above referred to will do equally well.

In addition to the drawer fronts, the bearers may be scratched in a similar manner, and not necessarily with the same beads. A bead on each edge rounding off the angle, and a hollow between, as in Fig 25, will look very well, and the same may be said of the "sunk moulding," shown by Fig. 26. In both these instances it will look better to set the front back, or within the bearers a little, as suggested in the illustrations.

It will also occur to the reader that the front edges of the ends may be finished off in a similar manner to the bearers. With the outer edges no difficulty can occur, but there may be some hesitation about the others, so it will be seen at once that the moulding or bead cannot be run through the joints of the ends and bearers. They might be worked through, but the effect would be very unpleasant, and I do not think the method would be approved of by any one accustomed to good cabinet making. The better plan, if these edges are to be moulded, will be either to stop the bead before it reaches the bearer, or work it up to a mitre with that on the drawer bearers. In either case, the bead or moulding will have to be finished off at the end with carving or other cutting tools, as the scratch will neither work a clean stop nor yet effect the mitre.

The front of the fall may also be treated with scratches on the framing, the beads terminating with the ends of the frame pieces, *i.e.*, they will not be run across cross grain, but be stopped at the joints. Of course if the framing is mitred, the beads will be formed also to a mitred angle, but, as has been said, a mitred framing is hardly in consonance with Early English. If the panel of the fall is sunk within the framing, it, too, may have two or three rows of beading scratched along it; and the same may be said even if it is flush, though I almost hesitate to recommend beading in this case. Beads may also be run from top to bottom on the ends of the bureau, though, for my own part, I should prefer them plain; but if they should be preferred, try to utilise them by concealing any join that may have been necessary. This can easily be managed by arranging the cutter so that the line of the joint is just between two beads. Three or four sets of beads at regular intervals between will be quite enough for each end.

Now for mouldings. The only parts of the work to which these can be applied successfully are to the edges of the drawer fronts, and round the inner edge of the fall framing. Many suitable patterns of mouldings may be found, from the simple one shown in Fig. 5 (page 738), to the more elaborate outline given in Figs. 27 and 28. It will not do to have the mouldings too large and heavy-looking, but as so much depends on personal ideas of excess in this direction, nothing definite can be said beyond that I consider the sizes shown in the last-named illustrations suitable. It must not, however, be taken that for all mouldings, whatever their outline, these sizes are best. It would, for instance, look clumsy were the moulding in Fig. 5 to be enlarged to it, and, of course, no one would think of using an architrave moulding for drawer fronts, such as those under consideration. With these remarks the size of mouldings may safely be left to the reader's discretion.

Whatever the pattern, they are to be neatly mitred at the angles and attached to the fronts of the drawers flush with their edges, making, as it were, a kind of projecting moulded frame on the surface of each front. Any beading that may be required on the fronts must be done before the mouldings are stuck on. Glue alone ought to hold them securely, but a few brads or wire nails, driven in where they will be least perceptible, may be used as well. The nails should be well sunk, and

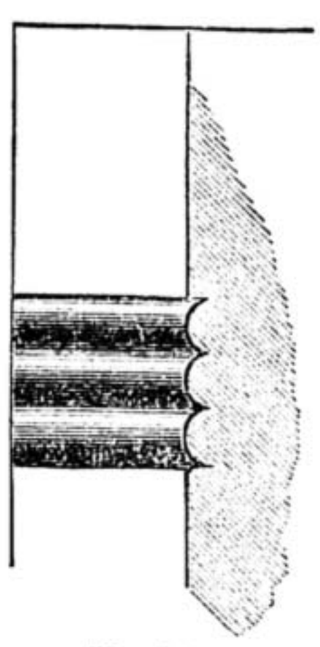

Fig. 24.

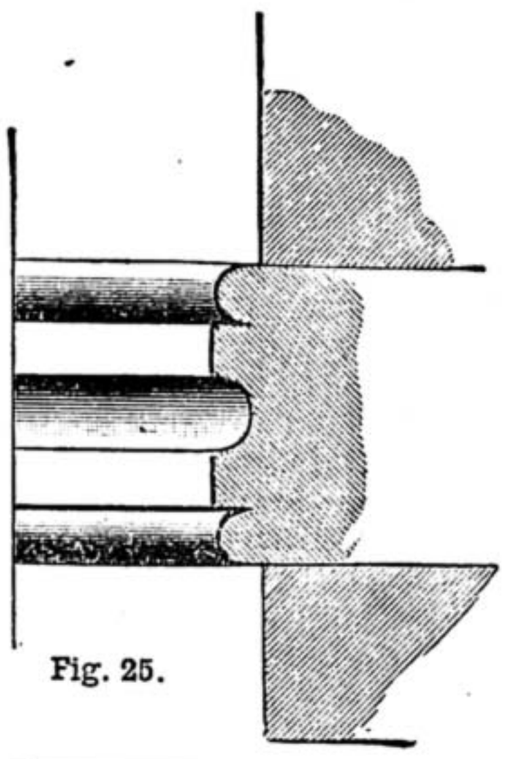

Fig. 25.

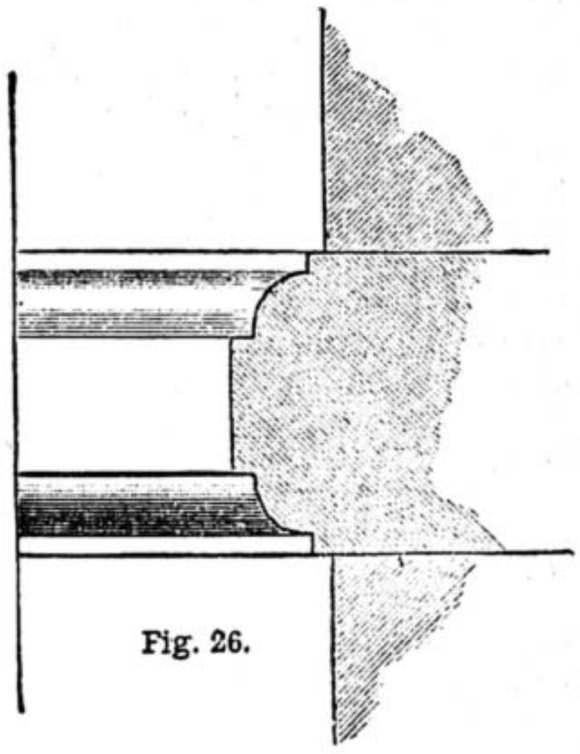

Fig. 26.

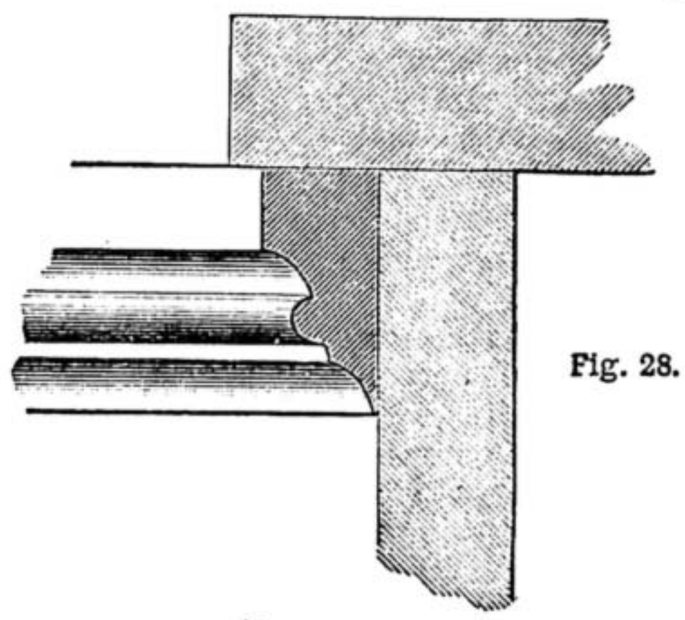

Fig. 28.

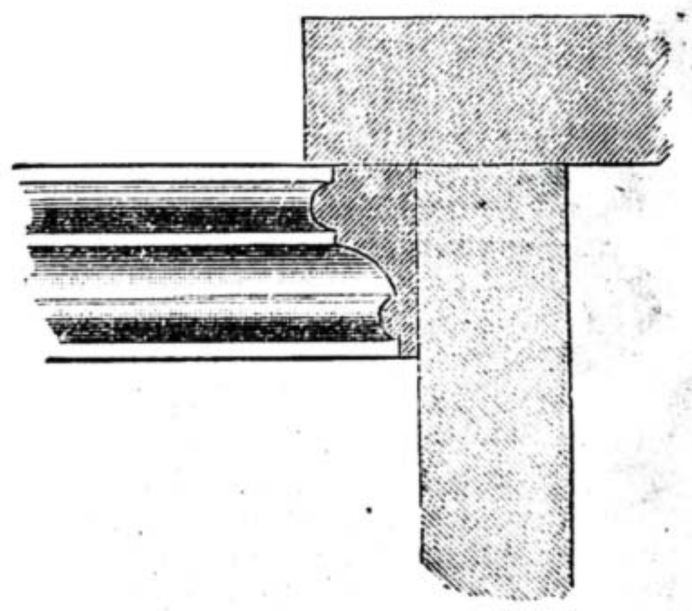

Fig. 27.

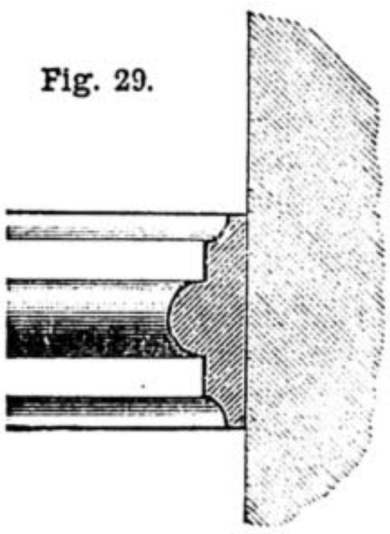

Fig. 29.

Fig. 30.

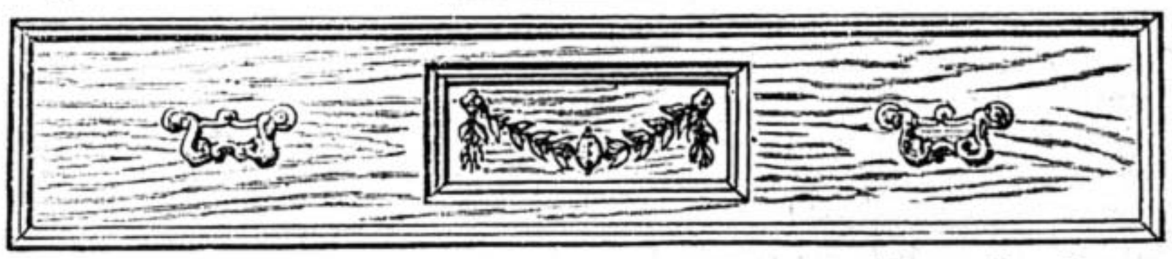

Fig. 31.

Fig. 24.—Beads on Drawer Front. Fig. 25.—Beaded Drawer Bearer. Fig. 26.—Alternative Bearer. Figs. 27, 28.—Moulding on Drawer Fronts. Fig. 29.—Moulding for Fall. Figs. 30, 31.—Drawer Fronts.

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the holes filled in with stopping. As these will only be small, probably a little shellac melted into them will do very well. Figs. 27 and 28 show that the drawer fronts are set back, so that the mouldings, when the drawers are closed, do not project beyond the bearers, but are rather within them.

If the fall panel be sunk, the same mouldings may be placed round it on the edges of the frame, the corners being mitred. With a flush panel the mouldings must be modified, so that they can be stuck on to hide the joint. A suitable moulding for the purpose is shown in Fig. 29. I must frankly say that I do not like this alternative, and it will be far better, if mouldings are to be employed, to have a sunk panel.

Possibly it may be wondered whether no carving is admissible. If so, it may be said that, as a rule, it is not found on ordinary Early English furniture, but at the same time there is no valid reason why the bureau should not be adorned with it if the maker wishes. As regards the scope of consideration of Early English design, it is, however, unnecessary to do more than say that carving, when resorted to, is usually unimportant. It may, however, not be out of place to say that as the source whence the Early English of modern furniture sprung is clearly the Tudor and allied styles, that carving inspired by them can scarcely be considered out of character. Carving is not necessary, but it may be added as perhaps the clearest way of expressing the matter, that I think the majority of us would be rather inclined to class a bureau nominally in the Early English style with such carving as one generally sees as a "Queen Anne." This will be the next to be considered, but before doing so attention may be called to the rich effects which may be got by a judicious use of the beads and mouldings alone.

Something should also be said about the plinth. That in Fig. 1 (page 600) would be more appropriate, and would do very well with a plainly beaded bureau, but a suitable moulding along the edge, instead of a bevel, would be better still, especially if mouldings are used on other parts.

It is possible that some readers may object to stuck-on mouldings. Many of our leading writers on, and critics of, modern furniture do, and not without a certain show of reason sometimes. Their arguments are mostly based on theory, and were it my intention to show how furniture might be got up in the most costly manner, without considering whether it would practically be any better either in appearance or usefulness for the superfluous expenditure, nothing would have been said about mouldings, or, rather, the directions would have been for them to be worked out of the solid. As it is, my wish is to help novices to construct good every-day pieces of furniture without any unnecessary labour, and to take full advantage of methods of construction which practical experience shows to be satisfactory. Those, of course, who fancy any process of either decoration or construction which I have advocated is wrong may leave them alone, and substitute others if they prefer to. I do not profess to teach those who are satisfied that they know all about everything connected with woodwork, for most of them cannot learn much—not even that there may be more than one way of doing anything. If possible, the style known as Queen Anne is even more vague than the Early English when furniture is referred to. It is almost impossible to define any lines of demarkation between the two which shall convey, without an exhaustive treatise on them, a clear idea. In very distinctive designs, of course one can do so; but the two styles are so merged into each other that it is not easy to say positively of many details that they belong exclusively to one or other. Thus in the mouldings mentioned when treating of the Early English bureau, we have met the Queen Anne style half-way, for many would feel disposed to classify a piece of furniture on which they occur as Queen Anne. Nevertheless, we may get some characteristic bits which may very well entitle even a plain piece of furniture like our bureau to be called a specimen of the modern version of Queen Anne furniture.

Let the mouldings be retained, even the beads if you will, but add a few carvings in the form of semi-conventionalised foliage, flowers, etc. I cannot commend the heavy swags of fruit and garlands of flowers which one often sees used, as they seem to be dangerously bordering on the strange devices which were in vogue immediately before the present Renaissance; there is, however, no reason why, in a modified form, such things should not be used. For instance, a little conventional drapery or a festoon may be carved on the drawer fronts, as suggested by the accompanying illustrations, Figs. 30 and 31. These will be quite enough to guide the carver, but it must be remembered that they by no means indicate the extent to which Queen Anne details may be applied when the construction will allow of anything more elaborate. It would be a comparatively simple matter to design a bureau with a very considerable amount of Queen Anne detail, but to do so it would be necessary to depart from the object of these instructions, which, it will be remembered, is to show how the original plain bureau, without altering its general shape or construction, may, in some measure, be invested with the features of various styles. I trust this has now been done in a way that may be suggestive to the novice either in making or designing, and, accordingly, take leave of this part of the subject, reserving any further remarks which may be considered advisable till a future opportunity, when perhaps sundry points, such as internal fittings of the upper part, secret drawers, slope for writing on, etc., may receive the attention they deserve.

THE SLIDE VALVE.

BY T. R. BLACKETT.

OBLIQUITY OF CONNECTING ROD, ETC. ETC.

IN order that the slide valve will do its duty in a proper manner—viz., to admit, cut off, and exhaust the steam at the required part of the stroke—we must have a connecting rod of sufficient length to give a proper balanced action to the engine. In explanation of the above, I may briefly state that while the piston only moves through a distance equal to twice the stroke in one revolution, the crank-pin describes a circle exactly 3·1416 × by the stroke. Here is the proper relation between piston and crank. In the case of an ordinary horizontal engine, we have a connecting rod, one end of which takes the cross-head and the other the crank-pin, thus at every forward and backward stroke of the piston it changes the linear motion to a circular one. It will be seen by examining Fig. 5, where we have a very short connecting rod (exaggerated to point out the matter clearly), that while the piston is at *its* half stroke, the crank has not yet reached *its* half stroke or half centre. Now drop the connecting rod to the bottom half-centre, and we see that it crosses the centre of circle described by the crank-pin, as shown by the dotted lines in the figure. To overcome this obliquity of the connecting rod, it is necessary that it must be as long as possible—about two and a half times the length of the stroke. I have designed, during the last fifteen years, a good number of horizontal engines, and have given from 2½ to 2·6 times the length of stroke for

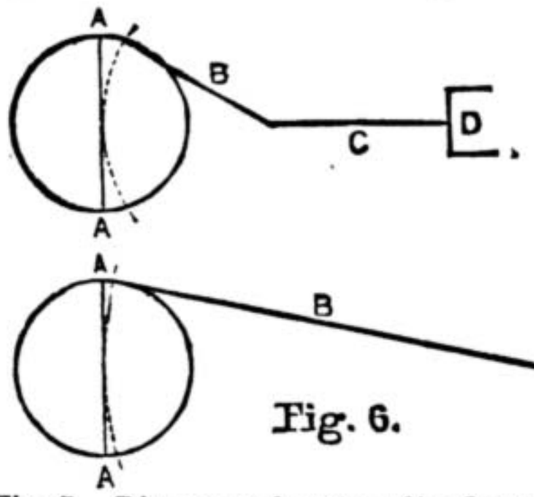

Fig. 5. Fig. 6.

Fig. 5.—Diagram showing disadvantages of Short Connecting Rod. Fig. 6.—Diagram showing advantages of Long Connecting Rod—A A, Half Centre; B, Connecting Rod; C, Piston Rod; D, Piston.

connecting rods, and find, from actual practice, that that length answers well. If such a rod is made in proportion to the strain it has to bear, it will be found that there is no fear of buckling or bending, which some makers affirm against long connecting rods.

Fig. 6 represents by centre lines connecting rod of proper length, with an arc, shown by dotted lines through the centre of circle described by the crank-pin.

By giving a slide valve "lead," we give it not only to the steam port alone, but to the exhaust port also; in other words, it causes the exhaust port to close sooner than if we had given the steam side no "lead" at all. Hence we see "lead" is intended to give a "cushion" to the piston at the end of its stroke. If there was no cushion we would be sensible of the fact by a series of raps or blows at each end of the piston stroke, which, in the case of a high-speed engine, would be most unpleasant. In very large engines whose number of revolutions do not exceed forty per minute, I have seen the slide valves set with "lead" equal to the thickness of a piece of note-paper.

I would advise any one who intends to make himself master of the slide valve to construct a wooden model with crank and eccentric sheave, slide valve and rod, also a slot for a piece of wood to represent the piston in the cylinder. He will then be able to see more clearly than if he had only to depend on his memory. Similar models are used by "demonstrators" in our principal engineering schools.

Should any reader wish for further information regarding a wooden model, I could give it in "Shop." My reason for not giving it here is that every one who intends to master the slide valve will be able to rig up a rough model good enough for his purpose.

Now, with regard to "lap," it is put on the slide in order that we may work steam expansively. For instance, we wish to cut off steam at half-stroke, with our boiler pressure at 30 lbs. per square inch. Now, having cut off at half-stroke, we have the cylinder half full of steam at a pressure of 30 lbs. per square inch; thus it stands to reason that when the piston has reached the end of its stroke, the steam in the cylinder will have expanded to twice its volume, but diminished to half its pressure —viz., 15 lbs. per square inch. This is

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called the expansive working of steam. I have given the above as a sample case. We might have an engine where we wished to cut off at one-quarter of the stroke with a higher boiler pressure. But with regard to "lap," in designing our slide valve there is a good rule, which, I am sorry to say, I cannot give in a simple form, so that our highly skilled, but not highly mathematical, workman could understand at a glance. It is this:—

From the length of the piston stroke subtract that part of the stroke at which it is intended to cut off steam; divide the remainder by the piston stroke, and extract the cube root of the quotient, which multiply by half the stroke of valve, and from the product take half the "lead." The answer will be the exact "lap" required. This may appear a complicated rule, but it is none the less accurate and mechanical.

SIGN-BOARDS.

BEING HINTS ON THEIR CONSTRUCTION FROM A CARPENTER'S POINT OF VIEW.

BY B. A. BAXTER.

In all woodwork, or, indeed, in all work, it is of great benefit and value to observe and remember any apparently small details in treatment of material by those who have experience.

We can scarcely go into a timber yard without observing that the ends of the choicest logs and stacks of boards are covered with some paint or composition to prevent gain or loss of moisture taking place at the end of the plank. The merchant wishes his wood to dry, but he prefers that it shall dry as equally as possible. The structure of wood is very much like an assemblage of tubes bound together, and the timber merchant knows that it is better that the ends of the tubes shall be sealed up, and that the drying shall take place on the larger surfaces.

For the same reason he keeps his choice timbers out of the direct rays of the sun. Rapid and partial drying means unequal and violent contraction, and this leads to cracks and shakes in the wood.

Apply this to sign-boards, and we may generalise that end grain should be exposed as little as possible, and that, where it can be, it is to be painted as effectually as circumstances allow.

If an experienced carpenter were asked to describe a cheap and yet a serviceable sign-board, I think he would say, "Have a frame made the size required, dovetailed at the corners, having a thickness at least equal to the proposed board or greater, and about three times its thickness for the breadth of framing, say panel of 1-in. stuff; make a dovetailed frame of 3½ in. by 1 in., or 1¼ in. Let the ledges which cross the board be mortised and tenoned into the frame as in Fig. 1. In order to avoid weakening the frame, these mortises should be near the centre of its width, and the shoulder behind the ledge (what is generally called a 'bare-faced tenon'); let the board itself be fitted easily into the frame, and screwed from the back through holes in the ledges, all the holes except those in the centre being elongated to allow for a trifling movement."

The end grain of the board having been painted well before fixing, a moulding can now be fitted in the angle formed by the face of the board and the inner edge of the frame, and fixed to the frame and not to the board. This plan will ensure a durable and an economical construction.

As to the kind of wood, I can only suggest mahogany or pine. I could not recommend pitch pine, because, though very durable, it is generally so full of turpentine that it spoils the paint if exposed to strong sunshine. In all cases, avoid sap in pine.

In these days of gigantic advertisements, some mention of the covered notice and sign-boards is necessary. A prepared canvas for the purpose is to be had, and is made in very large sizes by the floor-cloth manufacturers, which stands well—if only the frame has enough muntings to prevent the canvas vibrating like a sail under the influence of the wind.

Frames for these signs should be made of yellow deal from 3½ in. to 4½ in. wide, and 1½ in. to 2 in. thick, mortised and tenoned together like a door without panels, painted well before canvas is put on, and moulding applied to edge, either rebated or a piece screwed on to edge of frame, forming square of moulding.

The heart side of a sign-board panel is the best for the face side, but the workman always will do the reverse if unnoticed, as the outside is easier to clean off. Particularly should this be observed when, as in some signs, there is a prepared canvas glued upon the wood like a veneer. This is an excellent plan for curved signs.

Frames for glass signs may be made like Fig. 2, but with a moulding like Fig. 3.

There should be a soft cloth or felt behind a glass fascia upon the wooden back to prevent injury to the painting and gilding, which is, of course, at the back, and special care should always be taken to prevent the entrance of rain.

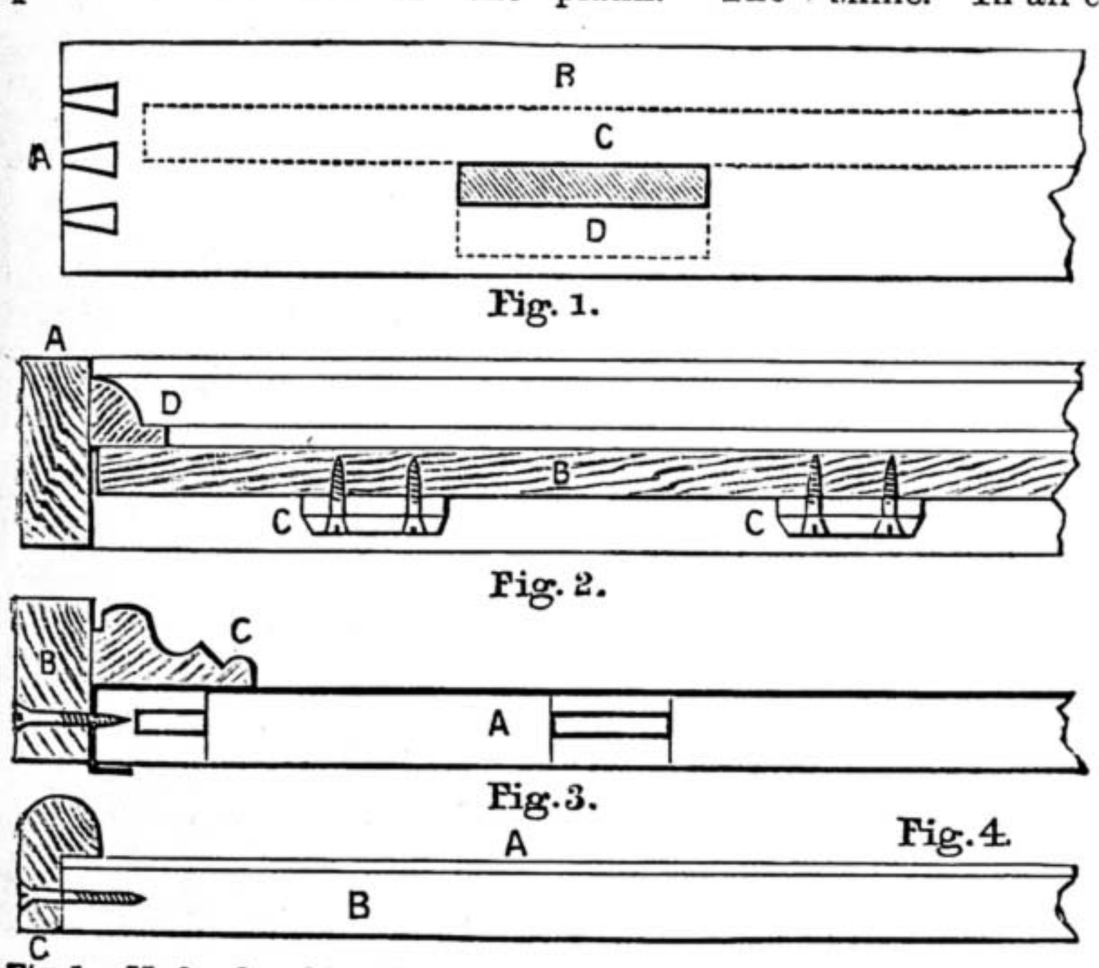

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 1.—Mode of making Frame for Sign-Board—A, Dovetailed Frame; B, Space within Frame for Moulding; C, Board; D, Ledge. Fig. 2.—Section of Sign-Board—A, Frame; B, Board or Panel; C, Ledge; D, Ovolo Moulding fixed to Frame. Fig. 3.—Covered Sign-Board—A, Frame of Styles, Rails, and numerous Muntings; B, Capping screwed to Frame; C, Large Panel Moulding fixed to Capping. Fig. 4.—Glazed Sign-Board—A, Plate Glass; B, Frame; C, Moulding fitted to Frame.

GESSO WORK.

BY E. C.

THE DECORATION OF PICTURE FRAMES.

THE illustrations in this, the concluding, paper on gesso work are intended to supply designs for the decorator of picture frames. Never was there such a demand for medium-sized and small frames as at the present time. Fancy frames are required for etchings, autotypes, and photos innumerable; and it seems almost impossible that there should be too great a variety of these. The plain white enamelled frames and those of brocade and of satin have had a long run, and gesso decorated frames may well now become popular. If any of the readers of WORK wish to make a profit on such articles they will need to attain great facility in producing decorations at rapid speed. Amateurs are proverbially slow workers; they are more given to perfecting details and finicking over "finish" than to attending to effects, which after all is the main point in decorative arts. Now, the outlines should be kept true and sharp, but the modelling of the foliage will not need the same amount of care and labour bestowed on it as a figure on a panel. It can be quickly done either with or without the aid of cotton wool.

A word on the subject of "relief" to amateurs. I find that the least experienced amongst them often fall into the error of supposing that high relief is effective. To a certain extent it is, but we must bear in mind the purpose of our decorations. There is no true art in subordinating the picture or photo, which should be the centre of interest, to the ornamentation of the frame; therefore the design should be kept in rather low relief, and the colouring should be quiet in tone. The latter is more important if the photo is coloured; for etchings, too, I like subdued colouring in the frame, but for plain photos a bright frame is far from objectionable.

I will take Fig. 2 of the illustrations first for consideration, and suggest several ways in which it might be treated. I should choose that the frame should have rims slightly raised at both edges, so that the part to be decorated may appear sunk. It should be of walnut, rosewood or dark oak, or of some light wood stained to resemble one of these. Now for the design. Raise it a little above the wood surface by applying two or three coats of gesso; model the gesso with a brush, especially noting the tips of the leaves that turn over. Enrich it with gold lacquer only; for instance, the stem connecting the foliage that runs through the whole design could be touched with gold lacquer on both sides, leaving the most raised part white. Then the back parts of the leaves that turn over can be lacquered, and if veins of leaves are introduced they should be raised and the sunk portion on each side lacquered. A second mode of working would be as follows. Coat the design with gesso, keeping it quite flat. Cover the whole of it with gold lacquer, and silver the stems entirely and tips of leaves that turn over. This makes a lovely decoration with rosewood background. Again, instead of the background being of wood it could be coated with gesso and then lacquered green, or blue, or copper red. The rims in this case ought to be gilded. Yet another plan would be to carry out the gesso decoration entirely in blue and gold, and to silver the background. The design silvered, and just relieved with metallic blue, on a rosewood background would be admirable.

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I should feel inclined to treat Fig. 4 somewhat differently. If this design were done in plain gesso it would look a trifle heavy on a dark wood background, so I should introduce several colours and get a rich harmonious effect. First gesso the ground all over; on this raise the design and model it. Then tint the flowers and buds red, accentuating the folds of the buds, and giving roundness to the petals by adding touches of gold. Colour the leaves a soft bluish green and throw up the veins with gold. Lastly, gild the background. This will prove a handsome frame decoration well suited for a good-sized photo or etching.

White frames are much admired now for etchings. I do not mean alone the enamelled ones, but those of more uncommon style that are patronised by artists. I remember last season seeing an etching of a ship at anchor. It was a slight, sketchy production, no attempt having been made at elaboration; a few lines suggested the sea, but the effect was excellent. This was framed with a broad oak band painted white, and at one corner was a raised gilt anchor. The wood was not planed, but showed notches and cuts beneath the paint. The whole, viewed at a short distance, assumed a soft silvery-grey tone that was very charming. Now, I consider that Fig. 4 would answer well for such a frame. Say the whole ground is gessoed and left untouched with colour. The gesso is of a pleasing ivory-white tint, and the surface is smooth and appears polished. Raise all the design in gesso, but the buds and flowers may be in rather higher relief than the bordering leaves. Outline the design with gold lacquer, vein the leaves and mark out the petals with the same. Thus a chaste white and gold decoration will be obtained that will not clash with the most delicate etching.

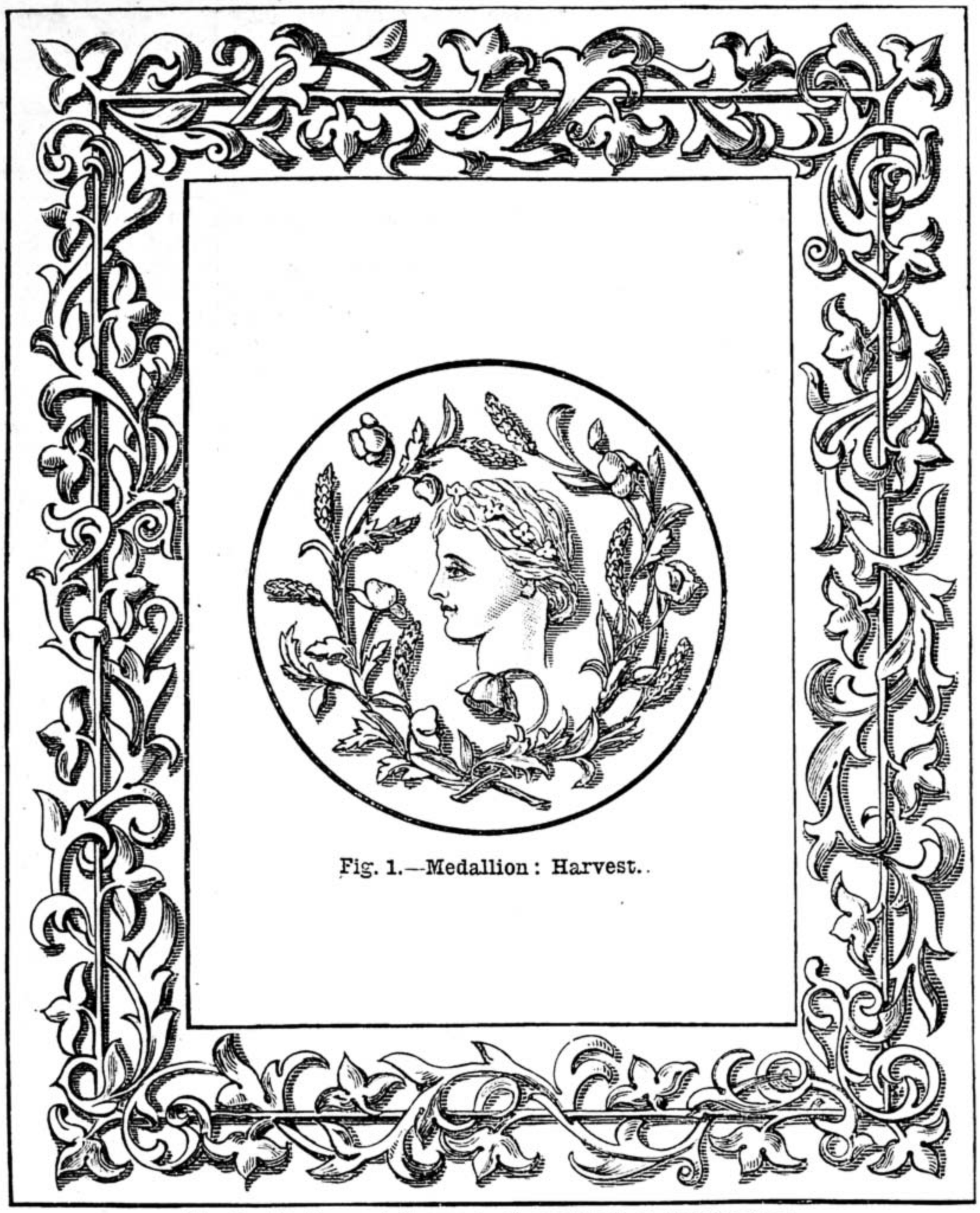

Fig. 1.—Medallion: Harvest.

Fig. 2.—Photograph Frame in Gesso Work on Flat Surface.

I would have no rims to this frame, and the etching should have a simple mount of white cardboard. Instead of the gold lacquer, brown oil colour could be suitably employed on a frame intended for a sepia drawing. A good mezzotint would be admirably set off by the white and gold frame.

The dragons shown in Fig. 3 will bear to be in higher relief than the conventional floral designs we have so far been considering. They should be well modelled and then coloured according to the worker's fancy. Here we have great scope for showing our skill in colouring. Rich, brilliant effects may be created with metallic colours, and such a design as this allows of uncommon harmonies. The ground should be of gesso, coated, let us say, with copper red, sprinkled with gold powder after the Japanese lacquer style. The dragons might be of gesso touched up with gold, the latter being used more strongly in the tails, on which strokes of gold may be closely laid, and the ears, eyes, mouth, and all outlines may be given with gold lacquer. Green and silver, or blue and silver, might be substituted for the red and gold. Or the dragons might be done with metallic blue, shaded into gold, in which case the background would be silvered.

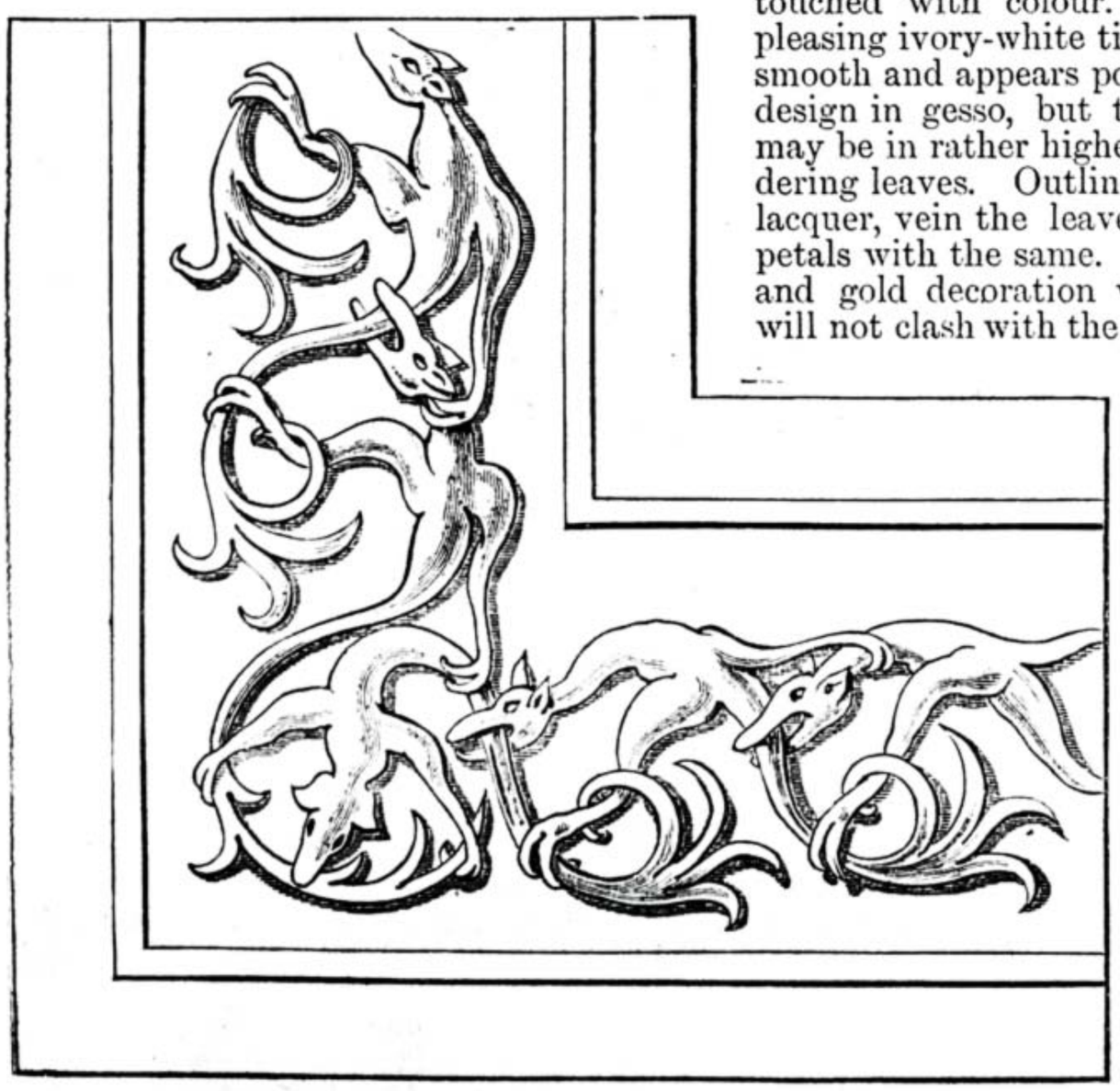

Fig. 3.—Corner for Picture Frame.

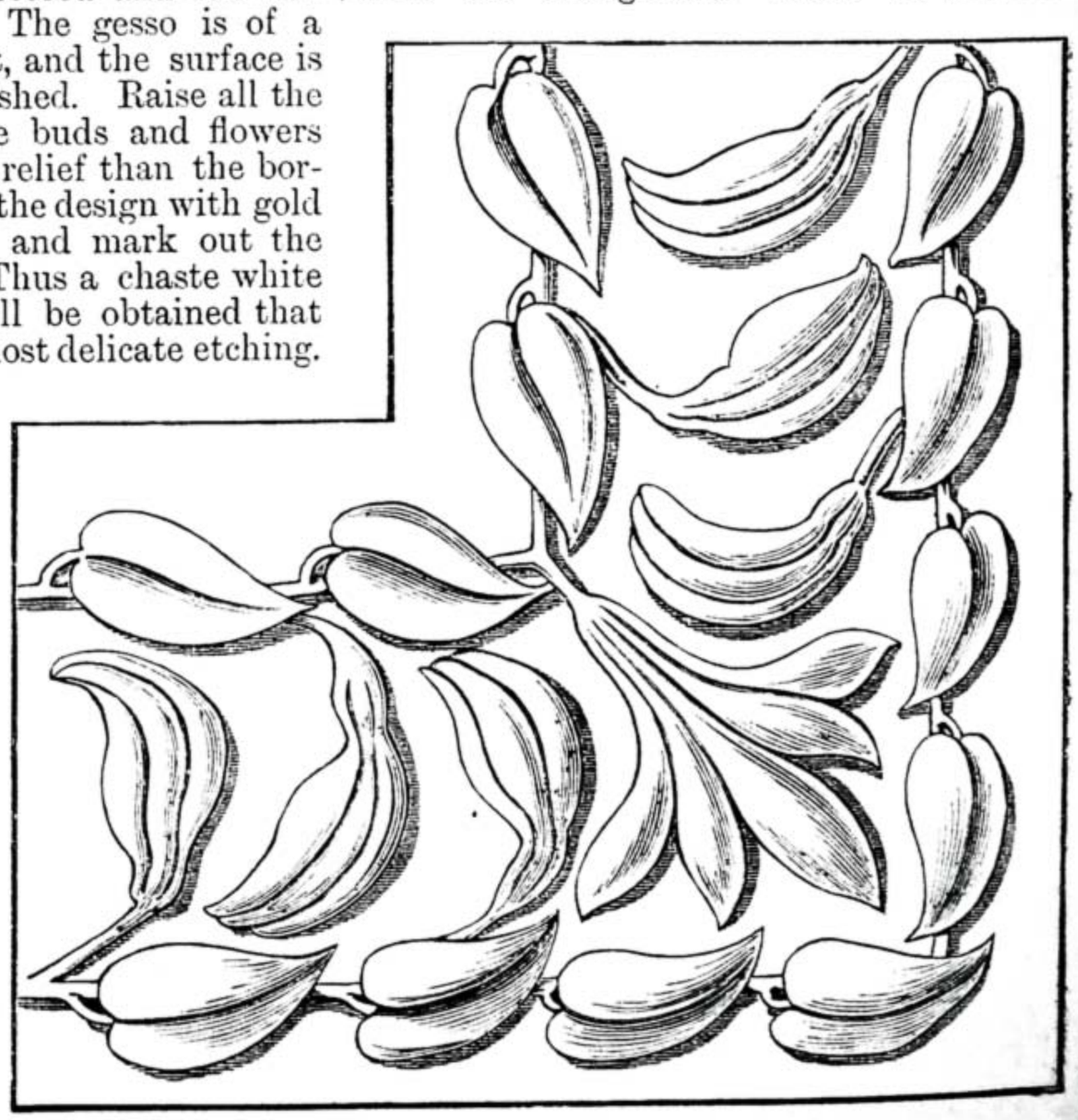

Fig. 4.—Corner for Picture Frame.

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The background of floral designs may occasionally be enriched by short strokes in gold being laid on with the brush, so as to form a series of broken lines. These lines should be repeated every eighth of an inch or so. On panels, the intervening spaces between the lines gradually increase until the distance between the upper ones measures an inch or more. Sometimes the lines become more broken and cease altogether, to be resumed at a long interval towards the top of the panel or the frame. The medallion (Fig. 1) may well be coloured in a more naturalistic manner than the frame decorations; still, we must not overlook the fact even here that effect is the main end to be kept in view. The head is to be modelled in gesso, the shadows given in brown only, and the hair to be slightly marked out in tresses with brown, the wreath of marguerites to be touched with gold; this will make it appear like a sculptured head. Some might prefer to tint the face with oil colours and to colour the hair auburn; then the flowers wreathed around the head should be white. All this is just a matter of fancy. The background I suggest is blue, gradually merging into gold at the top. The garland of flowers should be done in metallic colours—scarlet for the poppies, gold for the wheat-ears, and green for the poppy leaves and stems. The blue of the background should also be metallic, oil colours being reserved for the head.

I am convinced that all who study the art long enough to become proficients will be delighted with the result of their work, and they will not consider that the time spent over it has been in any way lost.

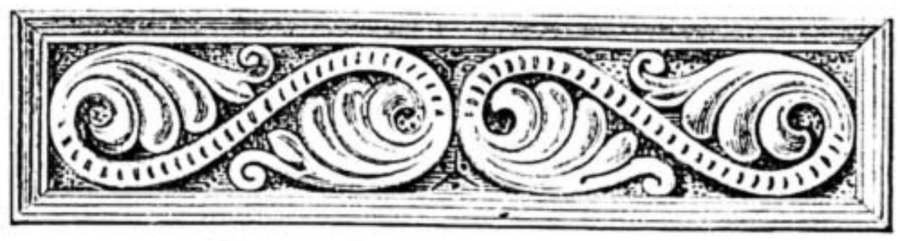


Fig. 1.—Carved Drawer Front.

Fig. 2.

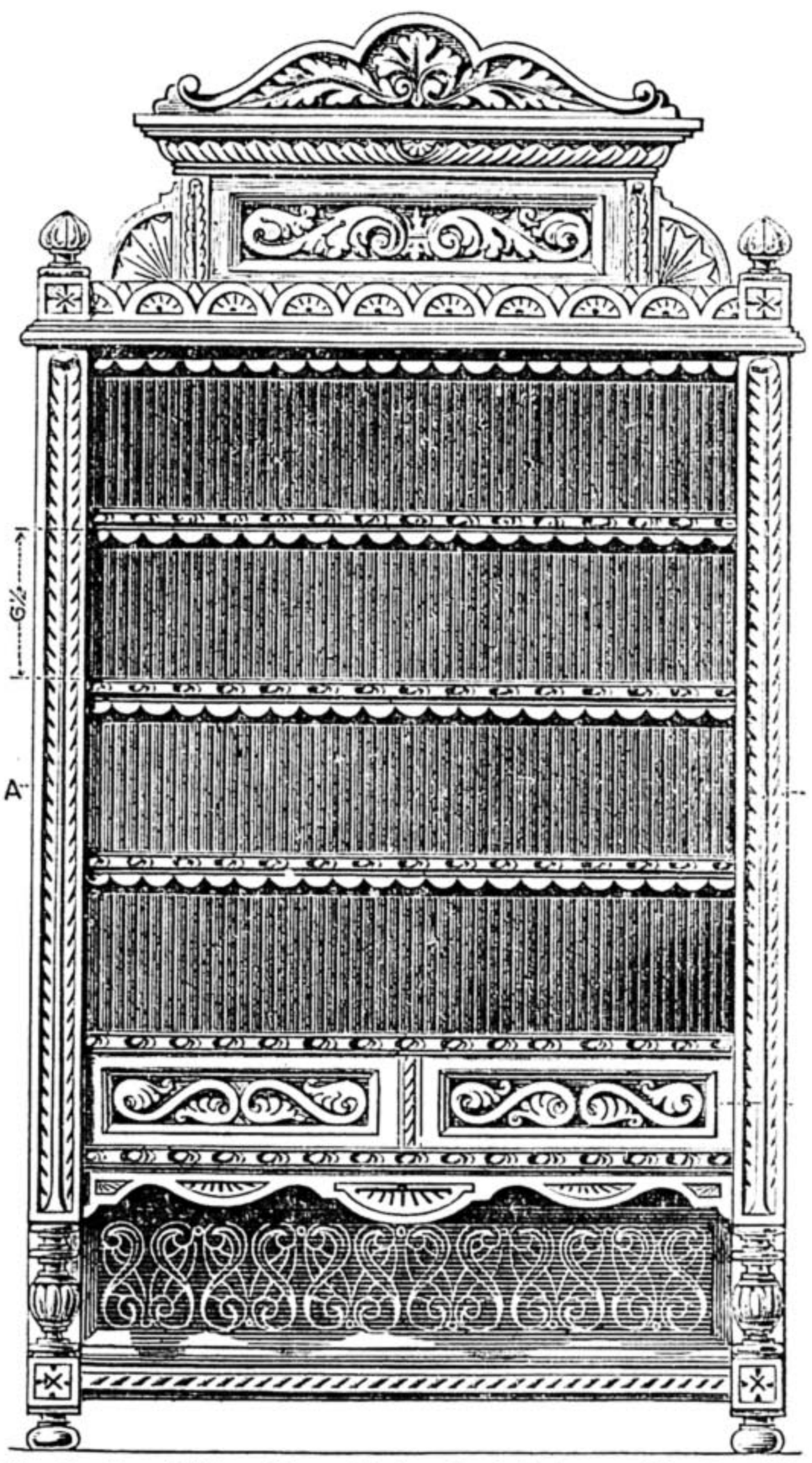


Fig. 4.

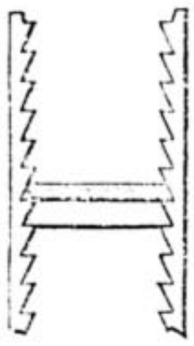
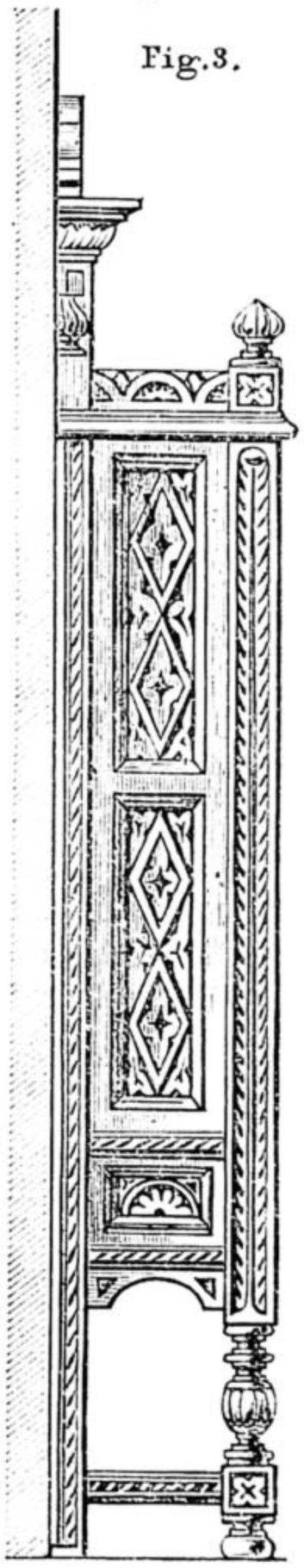


Fig. 6.

Fig. 5.

Fig. 2.—Front Elevation of Prize Bookshelves. Fig. 3.—Side Elevation. Fig. 4.—Details of Upper Part. Fig. 5.—Details of Pilaster at Foot. Fig. 6.—Rack for Shelves. (Scale, 1 in. to 1 ft.)

Fig. 3.



These drawers will be found useful for pens, pencils, paper, and other small articles. The top shelf may be utilised for the display of bric-à-brac and the lower one for pottery.

The carving is to be boldly executed and the ground stamped. The details given in Figs. 4, 5, and 6, the plan of the top shown in Fig. 7, and the section of shelves on the line, A B, in Fig. 2, exhibited in Fig. 3, will explain themselves, and there is no occasion to do more than suggest a few sizes for some of the parts, as for example: uprights, 1¾ in. square; panels, ⅜ in. thick; stiles, ⅝ in.; shelves, ⅝ in. thick, and carved on the edge as shown in Fig. 2. For making the drawers, the reader cannot do better than refer to the instructions given on this subject in "Lessons from an Old Bureau," and reference may also be made to page 233 of this volume for the method of making a bookcase.

The double rack work shown in Fig. 6, for taking supports for the ends of the shelves, might be dispensed with, the books being all of one size; but if the reader prefers to have movable shelves, he should look at page 233 of this volume, to which reference has just been made, and in which the method of making this arrangement is fully explained. The necessity of making a working drawing to scale, of a larger size than that of 1 in. to 1 ft. adopted for the illustrations here given, with the exception of Fig. 1, cannot be too strongly insisted on; and the carved work for the drawer fronts as shown in Fig. 1, the top and bottom of the bookcase, the edges of the shelves, the sides of the uprights, the pillars at the bottom, the finials at the top of the uprights, as shown in Fig. 1, and the

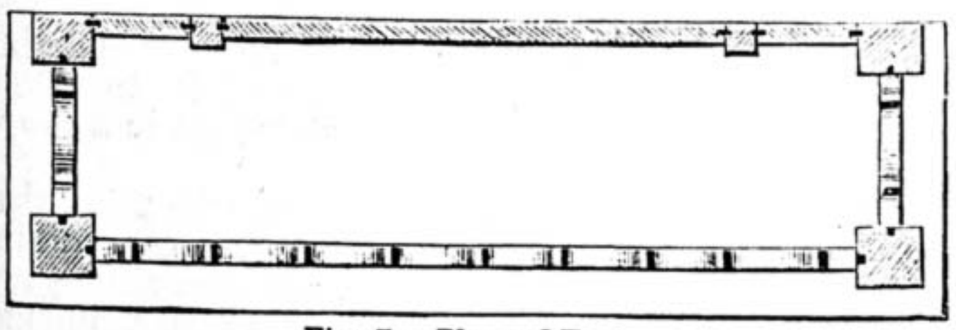


Fig. 7.—Plan of Top.

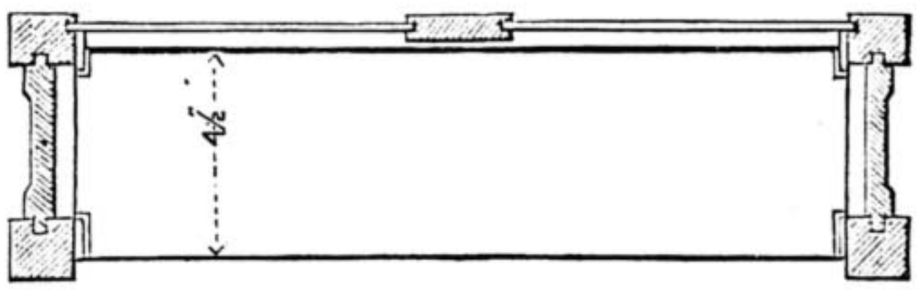


Fig. 8.—Section of Shelves on line, A B, in Fig. 2.

OUR PRIZE BOOKCASES.

III.—A Bookcase in Carved Work.

(For which the Third Prize of Half-a-Guinea was awarded.)

The bookcase, of which illustrations are given herewith, was the last of the three that were chosen as being most worthy of the prizes offered in the recent prize competition for the fitting and appropriate receptacles for the 208 volumes that form the series of best books by the best authors known as Cassell's National Library. These bookcases, it may be said, were chosen on the one part for their fitness for the purpose for which they were designed, and on the other as being types of different modes of treatment, each good in itself, but offering a striking contrast to those with which it was brought into juxtaposition.

With regard to material, the bookcase now under consideration is to be made in fumigated oak of a rich colour, the darkened hue in imitation of old oak being obtained, in one way, by exposing the wood to the fumes of ammonia, exposure in a stable where there are many horses being sufficient to produce the desired result. The lower part, as shown in Fig. 2, is fitted with two small drawers, the front of which is shown on a larger scale in Fig. 1, the front elevation and end elevation being exhibited in Figs. 2 and 3. panels at the exterior of the sides, as exhibited in Fig. 2, should all be carefully worked out full size before the workman commences the work of ornamentation with the carving tools. The scallops under the top and three shelves in Fig. 1 are intended to represent leather, attached to the under part of the shelf to prevent in some measure the access of dust to the top of the volumes.

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WAX POLISHING.

BY DAVID DENNING.

THE difficulties attached to French polishing any piece of wood, of whatever kind, are sometimes so apparently insurmountable to those who have not been properly instructed in the art that many a novice, after his first attempt at polishing, is almost inclined not to risk injuring whatever he may have made by polishing it. Such a feeling is excusable. He sees the thing in the white—as an unpolished article is technically called—nicely finished and clean. He knows well enough that if he could only polish it satisfactorily its appearance would be considerably enhanced, but remembering that his intended improvement may result in an unpleasant-looking surface, he reluctantly gets someone else to do this part of the work. Of course, in trade circles the polishing, as a matter of fact, is done by a polisher, but in small shops, and especially by amateurs, the desire is to do all the operations oneself.

Now, though no method of finishing more enhances the beauty of most furniture woods than French polishing when well done, there are processes which, though not capable of being brought to such perfection, are much simpler. Among these is the subject of the present article, viz., "Wax Polishing." This mode of finishing is so remarkably easy, both as regards materials and manipulation, that it is hardly an exaggeration to say that the unskilled novice can manage as well as the most expert. It therefore seems a suitable process for the first of a series of articles in which the more difficult operations will be duly explained.

Perhaps something should be said about the kinds of timber which are suitable for wax polishing, or "waxing," as it is often called. I have used the word suitable, but it may be said that, beyond custom and fashion, there is no reason why any wood should not be treated in this way. That to which it is generally, or it may almost be said solely, confined is oak, especially after this has been darkened by fumigation with ammonia—a subject which will be more fully gone into in an article on staining. The appearance of oak so finished will be familiar to most readers who have paid any attention to furniture. The finish is comparatively dull, but there is an attractiveness about it which the more highly finished French polish does not possess for all eyes.

For old oak furniture—whether by this is meant genuine or imitation antique—no finish is superior to wax, though, as is well known, varnish is often used.

While mentioning varnish, it may be as well to explain that wax polish, though it may not give the same amount of gloss, is, if I may so express it, clearer and finer looking. Varnish clogs the wood, and is apt, to use a very expressive trade term, to give a "treacly" look to any piece of furniture finished with it.

Mahogany, though seldom wax polished now, may very appropriately be finished by this means, and it may be questioned whether, for many purposes, it is not superior to the dulled French polish so often seen.

As is very well known, the top of a dining-table is very apt to be rendered unsightly from hot plates or dishes injuring the polished surfaces. The heat burns or blisters the hardened shellac of the French polish, so that any method of finish which is not so liable to disfigurement is preferable; and one of these we find in wax polish. It ought *en passant* to be said that dining-table tops are usually (unless French polished) simply oil polished. This, however, is more tedious than waxing, which is, at least, as suitable for the purpose, and the readiness with which any accidental injury can be repaired renders it particularly useful.

Wood stained black, or the so-called ebonised finish, may also have wax polishing substituted for French. The result is certainly a closer approximation to the appearance of real ebony than when the work is ebonised in the usual way. Special attention will be devoted to the polishing of fretwork articles later on, but it will not be out of place here to say that by means of wax they may easily be made to look better than so many of them do when unskilfully French polished.

It has been said that any wood may be wax polished, but at the same time a rough classification may be made—one which, though not strictly accurate, will enable those in doubt to decide for themselves whether wax will be an improvement. I do not know whether it is a rule strictly observed—in fact, it may be said there is no rule on the subject—but there can be no question that wax answers best on the more coarsely grained woods, such as oak, ash, etc., and that pine and other light woods of close texture can hardly be considered to be improved by it—unless, indeed, they have been previously stained. As the reader will now have a fair idea of the capabilities, advantages, and disadvantages of wax polish, the making and application may next receive attention.

Probably there is no material used by the polisher, and prepared by him for his own use, in which a greater variety of proportions is used. One man likes the polish thin, so thin as to be merely a liquid; another prefers it to be in the form of a paste. As such great latitude is allowable, the novice may wonder whether certain proportions are not better than others, or whether some polishers are not using the stuff to disadvantage.

It may, however, be said that so far as actual finish—*i.e.*, gloss—is concerned, it matters little what the proportions of the ingredients are. These, it may as well be stated, are in the simplest mixture merely wax and turpentine. Others, such as resin, Venice turpentine, etc., are occasionally added, but provided the wax be of good quality, they are quite unnecessary, if not prejudicial. Resin, when used, is added with the intention of hardening the surface, and in some instances it may be beneficial, but only experience can teach when it will be. The learner may be quite certain that if he cannot get a good result from wax and turps alone, the fault does not lie in the absence of resin. Venice turpentine, though mentioned as an ingredient in some of the old receipts, is by no means an indispensable ingredient, and it may fairly be questioned whether it is of any use whatever. It rather savours of quackery, or the mystery with which some of the masters of arts and crafts appear in former times to have endeavoured to conceal their actual mode of working. I have known Venice turpentine to be employed in making wax polish, so that those who would like to try it may experiment on their own account, remembering that a very small quantity is recommended.

To prevent any misconception then, let it be clearly stated that wax and turpentine alone are all the materials necessary to make a good wax polishing paste, and that when anything else enters into the composition the mixture is one of a fancy character. This is not the place to discuss the qualities of beeswax which are offered for sale, and it must be left to the polisher's own decision what kind he gets. Some advocate the use of fine white wax, and possibly a slightly better finish may sometimes be got with it than with the ordinary yellow wax. This, however, is generally used, and the only occasions when I would suggest that it might not be so good as the lighter colour are when extreme purity of tone is required for a white wood. A perfectly white wood is, however, so seldom wax polished that, for all practical purposes, at present it may be considered non-existent.

It will readily be understood that the way in which the wax polishing mixture is prepared depends a good deal on the proportions of the materials. For a thin liquid—or should I not say a liquid polish?—it is sufficient to shred the wax finely, and then pour the turpentine over it, leaving the two till they are incorporated. The turpentine will, however, only dissolve the wax slowly, and a much more expeditious method is to melt the wax by heat, and then, before it has time to solidify, the turpentine is poured into it. Naturally, when melting wax, caution is necessary, and on no account should the turpentine be poured into the wax while it is still on the fire. With ordinary care, there is, however, no danger, and I only suggest the possibility of a mishap for the benefit of those who might otherwise overlook the inflammable character of turpentine vapour. As I have so far purposely abstained from naming definite proportions in the desire not to hamper novices, it may be as well to say that if they find the mixture either too thick or too thin for their tastes, they may easily alter the consistency.

If it is desired to thin a mass, which is, say, as stiff as butter, a very moderate amount of heat will reduce it to liquid form, as the turpentine already in it facilitates the change. More turpentine is, of course, added while the wax is in the liquid state. On the other hand, it may be necessary to stiffen the mixture, and in this case some more wax should be melted separately, and the original polish added to it. The heat of the freshly melted wax will probably be sufficient to cause all the materials to amalgamate. It should, however, be noted that the wax in any case should be thoroughly melted before the turpentine is added, as a lumpy mixture is neither pleasant to work with nor yet conducive to good finish. When exposed to the air, the natural tendency of a wax polishing mixture is to stiffen, on account of the evaporation of the turpentine. A considerable time must, however, elapse before there is any appreciable alteration, and the fact that a change does go on, however slowly, is just alluded to, to remind polishers that if they have any considerable quantity of the mixture standing over, they must not expect it to retain its original condition unless kept in a closed vessel.

Now, just a hint for those who think that the more ingredients a mixture contains the better it must be, and accordingly are not satisfied unless there is a certain amount of resin in their wax polishing paste. Resin does not melt so quickly as wax, therefore let it be melted or partially melted, first adding the wax gradually, and, as the cookery books say, "constantly stirring." Whether resin be used or not, the mixture should not be applied till it is cold.

Although, as has been said, the consistency of wax polish varies considerably, it would hardly be fair to leave the novice

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in a state of perplexity about the comparative merits of different degrees of stiffness or fluidity.

Perhaps the best way to explain matters so that an intelligent conception of the polisher's aim may be arrived at, will be to suppose a piece of pure wax—that is, wax without any admixture of turpentine—is taken by way of experiment, and rubbed on a piece of smooth flat wood. A certain amount of the wax adheres to the surface, which, when friction is applied, becomes glossy or polished. The labour, however, is considerable, and however well dry wax may do on a flat surface, a very short experience will show that when mouldings or carvings are to be treated the difficulties in the way of satisfactory application are considerable. Well, the remedy is obvious: the wax must be softened that it may be got into all parts of the work. Melted wax, therefore, might do, but even in putting it on to the wood it becomes cold, and consequently reverts to its original stiffness. This necessitates the scraping or tedious removal of superfluous wax, for it cannot be too emphatically impressed on the novice that so long as wax is present on the surface in visible quantities, polish or gloss cannot be got. We have then to get the wax to a fair working consistency by means of some suitable solvent, which turpentine has been found to be. It is cleanly, inexpensive, and evaporates sufficiently quickly, besides mixing well with the wax. We can now see why some polishers prefer what others might think an excess of turpentine. If a stiff paste is used, the wax is apt to be deposited in excessive quantity in places, necessitating a considerable amount of rubbing to remove it. On the other hand, a fluid polish spreads the wax much more evenly, but no gloss can be obtained till the turpentine has either evaporated or been absorbed by the wood. Unless the polish has been "slopped on" over the work, this does not take long, so that, on the whole, a thin mixture may be considered preferable to a very stiff one. Enough has been said to enable any one to determine for himself whether to use a thick or a thin paste, but there are always a few who think—and very likely rightly—that as safety does not lie in extremes, but in the middle course, they would like to have some idea what this is in wax polish. Possibly here, again, opinions would be found to differ, but I should say that a paste of about the same consistency as butter in hot weather might be regarded as a medium. Of course, those who use a wax polish mixture which could be poured would consider this stiff, while others who add very little turpentine, or who believe in resin, would consider it thin. After all, it does not much matter whether a thick mixture or a thin one be used, the result depending more on the manipulation of the material than on the material itself; and how this is to be applied may next be considered.

In the application of wax polish we find almost as great a diversity of opinion, or rather variety in practice, as in proportion of ingredients. The great thing is to have the wax—the turpentine, it must be remembered, is merely the vehicle for conveying this—evenly and thinly distributed, and so long as this is done, it is of small consequence how it is managed. Some say use a piece of rag, while others prefer a stiff brush to rub the wax in with, and both get equally good results. After the wax has been rubbed in, the polish is obtained by friction; or to parody a well-known advertisement, the more you scrub, scrub, scrub, the more you rub, rub, rub, the brighter the polish will be. In this final friction it is essential that the cloth or brush used be perfectly dry, as if it is at all damp, no polished surface can be produced. In any case, the brush or cloth used to rub the wax into the wood should not be employed to give the finishing touches. These are best done with a perfectly clean rubber, and if I may venture to lay down rules when the process admits of so much diversity in procedure, I would use, say, three sets of cloths or rubbers. With the first the mixture is to be rubbed on the wood, with the second it is to be rubbed off till a fair amount of polish is got, while with the third the rubbing should be continued till the surface is as bright as it can be got. Very likely some might prefer to be told exactly what material the rags should be of, how long they should rub, and a whole host of minor details, but though these instructions may seem vague, I wish to make the various processes connected with polishing as clear as possible and to give them divested of all the needless minutiæ which are popularly regarded as inseparable from the polisher's art.

There are enough difficulties in the way of practising it successfully without adding to them by insisting on fixed modes of procedure, and so hampering the intelligence of the worker, who will scarcely need to be told that without common sense no directions, however precise, would assist him to any great extent. So far as has been deemed necessary, directions which should enable any one to wax polish wood successfully have been given, and this paper may very fitly be brought to a close by stating that hard dry rubbing, with plentiful use of "elbow grease," are at least as important as the wax and turpentine. Though more simple than the French polishing process, that with wax is more laborious. For the purposes of these hints on waxing, the Latin quotation, *labor vincit omnia*, may be freely—very freely indeed—translated into the vernacular as "labour brings the polish up."

OUR GUIDE TO GOOD THINGS.

*** *Patentees, manufacturers, and dealers generally are requested to send prospectuses, bills, etc., of their specialities in tools, machinery, and workshop appliances to the Editor of* WORK *for notice in "Our Guide to Good Things." It is desirable that specimens should be sent for examination and testing in all cases when this can be done without inconvenience. Specimens thus received will be returned at the earliest opportunity. It must be understood that everything which is noticed, is noticed on its merits only, and that, as it is in the power of any one who has a useful article for sale to obtain mention of it in this department of* WORK *without charge, the notices given partake in no way of the nature of advertisements.*

128.—ERFURTH'S PATENT SCAFFOLD HOLDER.

IN page 728 of this volume an interesting account of some ingenious steel ties for the connection of scaffolding was given by Mr. John Charles King, under the title of "Science in Scaffolding." This induced Mr. J. Charles Schroeder, 49, Ferntower Road, Highbury New Park, London, N., to send me a prospectus and working model, on a small scale, of Erfurth's Patent Scaffold Holder, a simple and apparently secure means of fixing cross-poles to uprights without having recourse to ropes. Mr. Schroeder writes:—"I would beg to draw your attention to a patent scaffold holder for which I am agent in the United Kingdom, and which I venture to think is of greater safety and efficiency than the contrivances shown in your issue of this date (No. 46, Feb. 1, 1890). I beg to enclose a circular giving diagrams and full particulars of this holder. The same is already in extensive use in various parts of the Continent, and has met with universal approval. A number of these patent holders are about to be practically tested during the coming season by a well-known firm of builders and contractors in London." Mr. Schroeder further informed me that the patentee is M. Erfurth, in Teuchern (Saxony), and that the holder is patented in England under No. 1389 (1888). It is asserted that weakness and complication in construction have been the chief causes of failure of those hitherto brought into the market, but that this patent holder is superior to them all, being of iron and wrought in one piece, and consisting of a saddle arm, clamp, and counter-arm—represented in Fig. 2 by the letters *c*, *a*, *b* respectively—each provided with a spur, or point, which are forced into the scaffold-pole and cross-piece under pressure of the cross-piece and the weight thrown on it, and which are indicated in the diagram by the arrows at the letters *a*, *b*, *c*. The holder is fixed to the standard or upright pole by pushing it on sideways at the desired height and turning it with a jerk, the saddle arms pointing in an upward direction. This can be done with one hand in a few seconds. It is not requisite to drive in the spurs with a hammer, as the holder fixes itself automatically. When the cross-poles are placed on the projecting

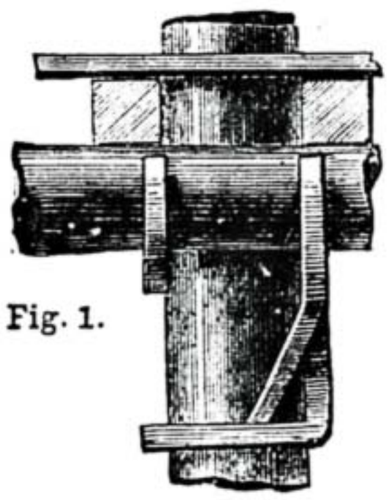

Fig. 1.

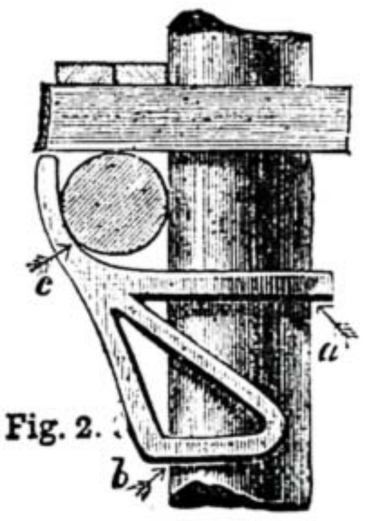

Fig. 2.

Fig. 1.—Front View of Erfurth's Patent Scaffold Holder in elevation.

Fig. 2.—Side View, showing Position of Spurs.

Fig. 3.—Another Front View of Scaffold Holder in perspective, showing Clamp on left side.

saddle arms, their weight presses the holder against the standard in such a manner that the spurs enter the wood and prevent the holder from slipping, thus affording the greatest security. The simplicity of the invention does away with the necessity of repairs and renewal of parts, which are said to form the great objection to other holders. It is claimed that the saving in time and cost of erecting scaffoldings when the holder is used is considerable, compared with the cost when holders with screws, wedges, and chains, etc., are employed. Although the initial cost of this holder is more than that of ropes, yet, owing to the short time which ropes last, and their liability to be lost or destroyed, the saving in the end is great; and when the time and consequent expense necessary to the employment of ropes are taken into account, the amount saved by the use of this holder is very large. The strength and durability of these holders are such that they will last for many years, and, owing to their capability of being packed in a small space, their transport is easy and inexpensive. They can be used with safety on a pole much smaller in diameter than the holder, and, moreover, it does not hinder the standards and cross-poles being joined when necessary. It is made in three sizes, namely, No. 1, $7\frac{1}{8}$ in. internal diameter, sold at 4s. 4d. each; No. 2, $6\frac{3}{8}$ in., at 3s. 9d.; and No. 3, $4\frac{3}{4}$ in., at 3s. 3d. each. The advantages claimed, as stated above, are certainly considerable, and the holders themselves deserve thorough and careful testing.

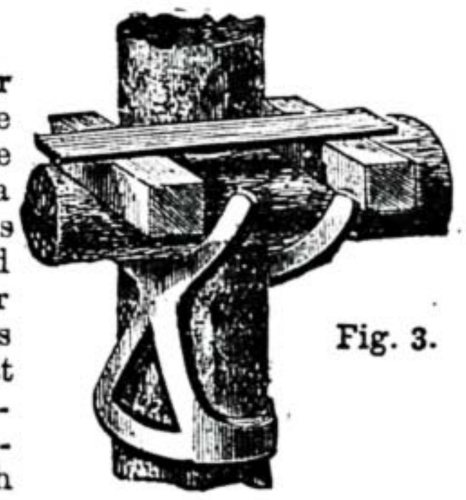

Fig. 3.

THE EDITOR.

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NOTICE TO OUR READERS.

With the next number of WORK (*No.* 53) *will be issued,* FREE OF CHARGE, *a large* SHEET OF DESIGNS IN WOOD CARVING (*size* 30 *in.* × 20 *in.*), *consisting of Twenty artistic and elaborate designs for various articles of Furniture in the Elizabethan, Italian, Old Dutch, North German, French* 15*th Century, and Modern styles. The various designs represent Chairs, Mantelpieces, Cabinets, Chests, Cornices, Pateras, Panels, Borders, &c.*

An Index to the First Yearly Vol. of WORK has been prepared, and can be obtained by order from all booksellers, price 1d. It is included in the last Monthly Part of the volume (Part 12).

SHOP:

A CORNER FOR THOSE WHO WANT TO TALK IT.

I.—LETTERS FROM CORRESPONDENTS.

Steel Castings. — STEEL MOULDER writes :—"The reply to J. T. (*Newport*) (see page 701) is somewhat misleading, because it is not so very exclusive. Nor is the making of them so difficult. If J. T. wishes to produce small castings from a few pounds weight up to 1 hundredweight, he can entirely dispense with ganister and ground crucibles, and also with the costly process of drying the moulds, and instead of the moulds being more refractory, for such size as the above indicated it is just the opposite, because the moulds should be only just firmly rammed, and as little moisture as possible used. But for heavy castings your reply is about correct. This is my practical experience of all kinds of steel castings, extending for a period of twenty years in some of the principal firms of this country, and if J. T. would like to write personally to me, or through the columns of 'Shop,' saying what kind of castings he requires, I will gladly try to help him as to the best way to produce them, and if he is a moulder he will not find it so difficult as it appears."

Wardrobe.—ARTIST IN WOOD writes :—"Fig. 1 is wardrobe end veneered so as to show rosewood panels and ash framework; also how the veneers may be put on in least possible time and best of joints made. Lay the panels first, then with the cutting gauge and straight-edge cut out the groove, A, to receive ash veneer. Lay in this veneer, then with cutting gauge and straight-edge cut out groove B, and cut off ends of panel veneers at C. Then lay ash veneers, B and C. Now cut off sides of panels and end of rails, then lay the stile veneer, D. Cut

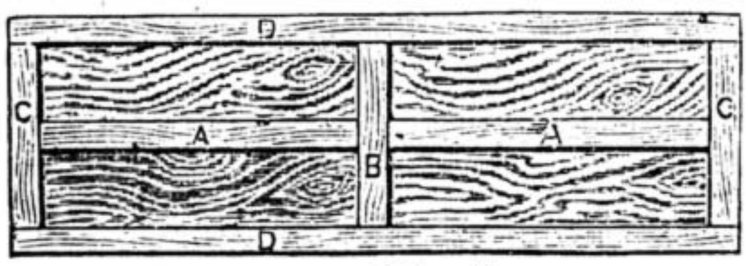


Fig. 1.

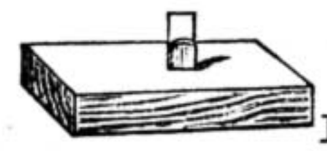


Fig. 2.

Fig. 3.

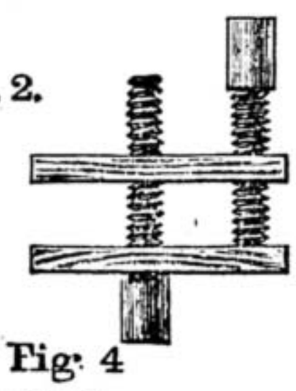


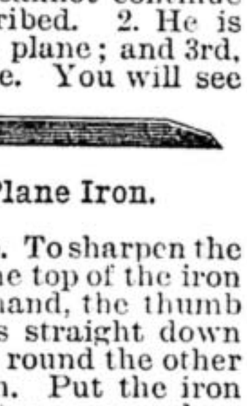
Fig. 4

Veneering Wardrobe.

out all veneers with the cutting gauge and straight-edge. Do not use a plane except in fitting in veneers, A and B. Fig. 2 is the cutting gauge made of wood, with wedge to fix the steel cutter. Fig. 3 is cutter of cutting gauge filed to a point from one side only. It is made from a bit of thin steel. A bit of bow-saw blade will make one. Fix the straight-edge on the work with hand screws (Fig. 4). Wardrobe ends are not often veneered. I send this sketch to show your readers a proper way of doing all such-like work."

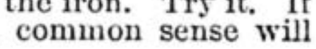
Painting Blackboards.—J. M. P. & Co. (*Nottingham*) write:—"We must take exception to J. F. K.'s description (see page 701) of the 'best' way of painting blackboards for the following reasons :—(1) The board will not preserve its 'dead' appearance after being used, but will become glossy. (2) The method he describes is as old as the art of making blackboards, and therefore should not be described as the 'best.' We are the inventors and makers of a composition for painting blackboards which will retain their 'dead' surface for years—indeed, until worn out—and we should be glad to send samples to any of your correspondents who may apply to us."

Hook-Turning Tools. — C. C. E. (*Lincoln*) writes:—"If our friend, F. A. M., had ever *worked* with hook tools, he would never have repeated, for the benefit (?) of TYRO (*Liverpool*), one of the very few mistakes to be found in Holtzapffel, Vol. IV. More than twenty years ago I procured Holtzapffel's tools, but as neither I nor any one else could use them I journeyed to Kingscliffe, to find that the tools were useless from two causes: first, the hooks were recurved as in Holtzapffel's book instead of being made like diagram, the point at A being prominent rather than curved back. Second, the stems are square instead of round. Hook tools, when properly made, are easily used, and will cut rapidly even into African black wood, but the rest must be *below* the lathe axis about 1 in. (not *above* it, as directed) and about 1 in. from face of work. Bore a hole, say, ½ in. to nearly full depth to be excavated, and begin at edge of hole with a light cut, the edge of hook being almost horizontal. A little practice will give confidence as to price of tools. W. Green & Sons, turners, West Street, Kingscliffe, Northamptonshire, will supply small 'hooks' at 1s. 6d. each; large, 2s.; square 'hooks,' small, 2s.; and large, 2s. 6d.; long handles, 6d. each. A very efficient tool, doing partly the work of a 'hook' and 'square hook' combined, has recently been devised, but it is so much more difficult to use that amateurs had better let it alone."



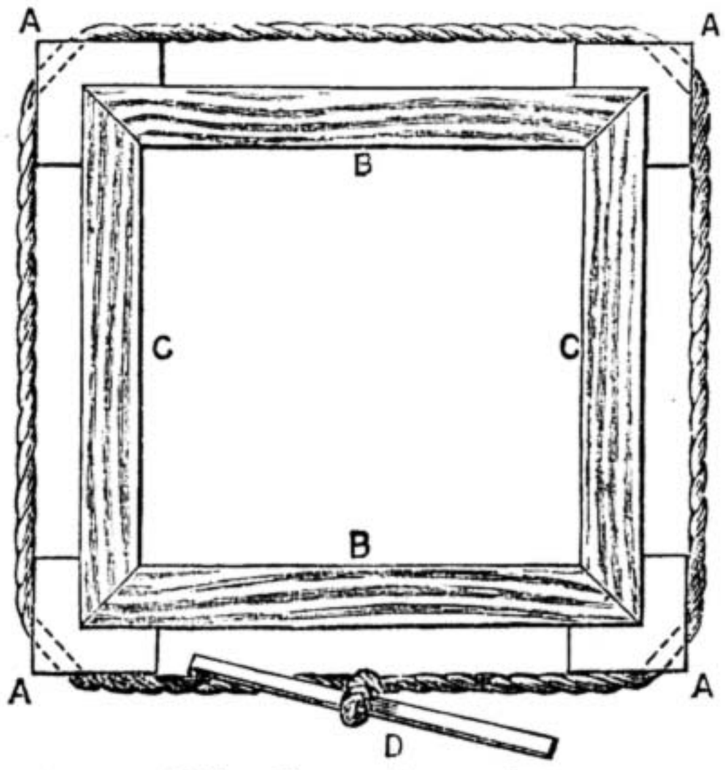
Turning Tool.

Sharpening Plane Iron.—DUMMY writes :—"I should advise R. H. (see page 651), and those who are inclined to follow his example, to forget an amateur's dodge and learn to sharpen a plane iron as it ought to be done, and not use a makeshift, slovenly dodge. In the first place, R. H. will find when the iron gets worn down he cannot continue to sharpen in the manner described. 2. He is wearing away the back part of his plane; and 3rd, he is not getting a true cutting edge. You will see by placing the plane in the position mentioned you get a bevel something like diagram, very stunted, and the iron would require grinding much oftener than it ought to do. To sharpen the iron, take it in the right hand, let the top of the iron rest against the thick part of the hand, the thumb round the edge, the two forefingers straight down the iron, the remaining two fingers round the other edge of the iron, holding quite firm. Put the iron on the stone, the bevel fitting the stone; now place the fingers of the left hand upon the iron, so as to give weight to it; proceed to sharpen; in doing so move the arms and not the wrists: the wrists must be held quite stiff, or you will roll the iron (as we call it). If your stone is in proper order, you will get a straight, smooth edge on the iron. Try it. If you endeavour to do as I say, common sense will soon show you your faults."



Plane Iron.

Mitre Cramp.—J. A. (*Wandsworth*) writes :—"Seeing in page 605 of WORK a query concerning the means of holding mitre joints, I send the following apparatus, which, though so extremely simple, is very efficient, and has a further merit with many that it costs scarcely anything. The



Mitre Cramp Apparatus.

sketch almost explains itself. The only things required are some wood (beech or oak) and some stout cord. Four pieces, A, A, A, A, are sawn out to the shape shown. If the inner angle is not a true right angle after being sawn, it must be made so by being pared with a chisel. Having made the opposite pieces, B, B, and A, A, the same length, and at the proper mitre angle, place them in position for gluing. Then tie the cord so that it will pass loosely round them, after which glue and tighten up the cord by means of the rod B. Before making the joints very tight, see if any of them overlap. If so, press them level with each other, and then tighten up fully."

Sign-Writing Charges. — B. J. (*London, W.*) writes :—"I send you prices of sign-writing about the West end of London :—Plain-colour per inch, ½d.; sunken letters in three colours, per inch, 1½d.; each additional shade per inch, ½d., if properly executed. Gold, 4 inches and under, 1½d.; ditto, 8 inches and under, 1¾d.; ditto, 12 inches and under, 2d. Mouldings ½ inch to ¾, per foot, 3d. To the trade at one-third less than the above."

Saw Hammering.—R. H. (*Bolton*) writes :—"I notice, while perusing WORK (see page 715), that J. N. (*Sheffield*) is willing to instruct any one that is in need of information on circular saw hammering; if he will be so kind, I have a 33-in. circular saw, that is dished or concaved about $\frac{5}{16}$ of an inch, and through that cause it bears hard on the packing. I have sent it to the saw repairer's twice, and he asked me if I used pegs, and I said 'No,' but I use cotton banding lapped round a piece of pine stick, as most sawyers do. I am a practical sawyer, and I think all the pegs in the world would not make a dished saw run and cut true boards. He has hammered the saw, but still it is as bad as ever after it has run a short time in the bench; the same saw has worked for years, and done well."

A Useful Tool.—F. C. (*Leytonstone, E.*) writes :—"I send sketch of a very useful tool. It is not a novelty, and is by no means new, but it may be easily made by an amateur, and perhaps save a lot of trouble and expense, and, I believe, is not generally known. It may be made as follows.—Procure two pieces of hard wood, say 1¼ in. square—ash will do very well for the purpose—one piece, A, Fig. 1, 8 in. long, the other, B, 4 in. long. In A run a saw

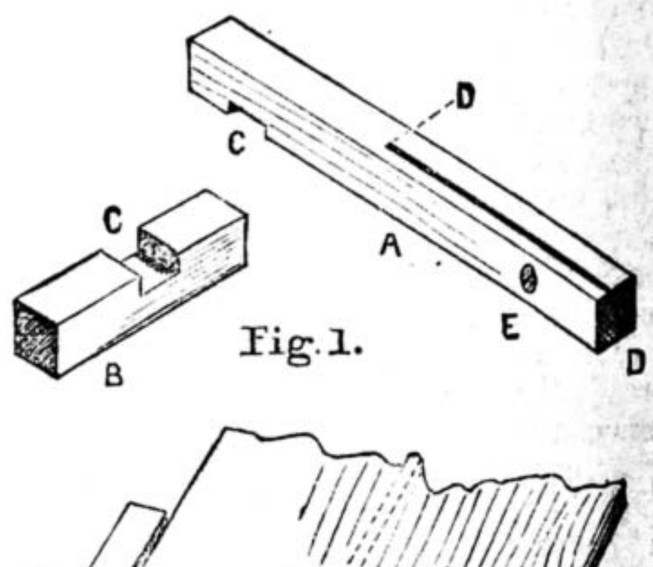


Fig. 1.

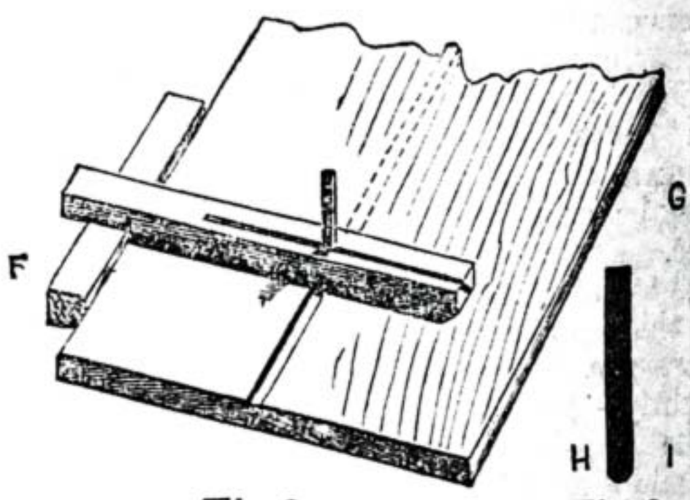


Fig 2. Fig. 3.

A Useful Tool.

cut, D; this is to hold the cutter; notch them together as shown at C. E is an ordinary wood screw. Fig. 2 shows the finished tool, and the method of using it to work a bead in the middle of a board. The cutter is held in its place by tightening the screw, E. In Fig. 3, three forms of cutter are shown—G works a bead, H a flute, and I a V joint. They are easily made out of an old plane iron or a broken chisel. In using it is necessary to keep the knee, F, Fig. 2, tight against the work."

Dulcimers.—W. Y. (*Enfield Lock*) writes :—"On page 254, under the heading of Sounding Board for Dulcimer, W. S. M. (*Leeds*), in reply to DULCIMER, gives him some advice with regard to this instrument. W. S. M. is evidently a maker of dulcimers, and as I am about to buy one, should like to correspond with him."

Change Wheels.—F. A. M. sends the following errata *re* Change Wheels (page 734), line 9, "28 is brass gas;" also in line 8, for 28 read 26. Line 23 from bottom, omit "therefore," and put a full stop instead, beginning new sentence, As we have."

Wheels.—W. P. (*Withington*) writes :—"I have been waiting for G. W. (*Bournemouth*) to answer R. B.'s (*Largoward*) query in 'Shop' with regard to the address of firms where he might procure ready-dressed timber for wheel making. As no reply has been forthcoming, I append a few more names out of a number than those which I gave in No. 46, page 734, in 'Shop,' as being situated in Manchester, and which would be inconvenient for those living down south; anything in the wheeling line can be procured from Messrs. C. and B. Gadson, 11, Bushfield Street, London, E.; or Messrs. Thomas Whittingham & Wilkin, 135 and 136, Long Acre, London, W.C."

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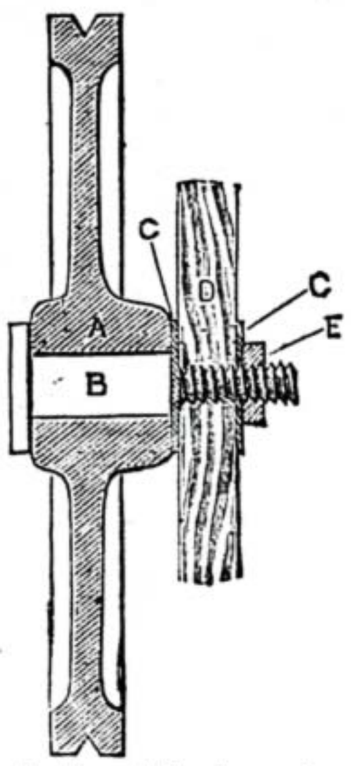
Parts of a Lathe.—S. G. D. (*Stroud Green*) writes:—"In the issue of WORK for December 14th I see an inquiry arising from a communication I sent you some time ago, and which you did me the honour to publish. Under the heading of 'Parts of a Lathe,' in 'Shop,' page 619, P. C. (*Bedfordshire*) seeks for further information about my temporary lathe attachment (I call it 'temporary' because by its aid I contemplate constructing a more elaborate and perfect accessory to the carpenter's bench). The wheel, A, is of cast iron, and its axle, B, is a bolt which is fixed to the bench, D, and secured by the nut, E, C C being washers; the accompanying sketch will make it clear. When I fitted up this attachment I had little time to spare, so put the wheel in the position that gave me least trouble to prepare the place for it. It would be a great improvement if the wheel was placed as near to the ground as possible, so that it comes well under the headstock of the lathe instead of behind it, and almost on a level with it, as is the case in the original arrangement shown in 'Shop,' page 508. By bringing it below the level of the top of the bench the necessity of removing it if the bench is required, say, for planing, is obviated. I should prefer brass or gun-metal bearings for the mandrel. The plummer blocks used for mine are simply of cast iron, and I am bound to say answer very well. Before making any article I generally plan it out on paper, and make careful drawings of the different parts to scale. I attribute a great deal of my success in mechanical work to this habit of drawing; it trains the eye, and is of immense value in teaching to measure and fit accurately. A moment's reflection will prove this; if an attempt is made to draw the parts of which an article is made, they must be carefully thought out, and what is carefully thought out at the beginning of the work has a better chance of being perfect at the finish than it would if done without such a system."—[Send in sketch and description of your lathe when ready if you would like it to appear in "Shop."]



Lathe Attachment.

II.—QUESTIONS ANSWERED BY EDITOR AND STAFF.

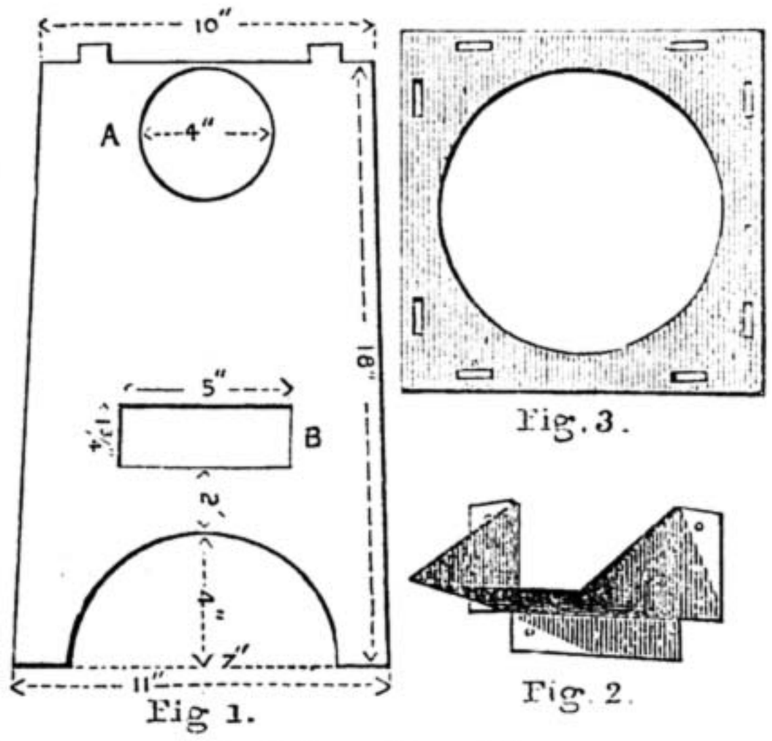
Schanschieff's Battery.—M. F. — The positive element of a Schanschieff's cell is a zinc plate, the negative element is a carbon plate; both immersed in a solution of mercury in a single cell. The E.M.F. is 1·56 volts, and the internal resistance ranges from 0·05 to 0·75 ohm per cell.—G. E. B.

Accumulator and Shocking Coil.—J. A. (*Shaftesbury Park*).—Respecting small accumulator, kindly see reply to D. SCOTT (*Holloway*) in WORK for October 12th. This will tell you how to make the plates. As you do not tell me the voltage and candle power of your lamp, I cannot say how many cells will be required, nor the size of the plates. The cells, to be light, should be of ebonite or vulcanite, and I think you would not be able to make these. Please look up my previous replies to correspondents, respecting Batteries for small Electric Lamps. Also read the articles which will shortly appear on Model Electric Lights. Respecting the shocking coil, one end of the primary wire—that is, the large wire wound around the iron core in the centre of the coil—goes to the foot of the spring of the contact breaker, and is clipped under it by one of the screws. From the foot of the pillar carrying the contact pin, a short thick wire goes to one of the binding screws on the base of the coil, and this is connected to the battery. The other end of the primary wire is connected to the other binding screw, and this to the other pole of the battery when you wish to set the coil in action. The finest wire is from the secondary coil, and this goes to separate binding screws.—G. E. B.

Gassner Battery.—G. W. (*Colchester*).—The Gassner battery is a patented article, therefore it is illegal to make and use it without the consent of the patentee. I do not know the proportions of its contents, so cannot advise you how to charge the battery. Why not make up a Leclanché battery for your bell?—G. E. B.

Electric Time Alarum.—AMATEUR (*Battersea*).—Kindly turn to replies on this subject given to ONE IN NEED (*Coventry*) and IRON TURNER (*Bolton*).—These will give you full information on how to connect the wires. What you suppose to be a lead rod is really a zinc rod, and furnishes the power in a Leclanché battery.—G. E. B.

Sheet Iron Stove.—DUTCHMAN (*Bristol*).—I do not remember ever seeing a plumber's stove made of sheet iron. It seems to me that it would wear out too quickly with the heat that it would get if in use constantly. I have made sheet iron firepots for my own and other people's use, for burning charcoal, but where coal or coke is the fuel I prefer cast iron stoves. There are some good stoves made specially for the purpose you require. Messrs. Rhodes & Sons, tool makers, Wakefield, supply a good strong one at 27s. 6d., and Messrs. Fletcher and Co., Warrington, make one in which gas is the heating power, the price of which is 15s. I can confidently recommend either of them, but as it is probable that you may be already aware of this, and still wish to make one yourself, I will endeavour to help you all I can. You must make it out of stout plate, say, 16 in. gauge; use charcoal iron, or the mild steel which is fast superseding charcoal iron; its better quality will repay you for the slightly higher cost over common iron; cut out two pieces as shown in Fig. 1. In one piece cut out the circular hole, A, 4 in. diameter, or a little less, letting the edge of the hole be ¾ in. away from the edge at the top. This is for the back of the stove. The other piece will, of course, not have the circular hole, A, but cut in that the oblong hole, B, 5 in. by 1¾ in. The tenon pieces at the top are to rivet on the top with; instead of these, if preferred, you could rivet angle pieces ¾ in. by ¼ in., and drill and tap them, and screw the top on with stove screws. Punch a row of holes (1/16 in. or ⅛ in.) down each side, about 1¼ in. apart, and ⅝ in. from the edge of the plate; mark down each side a line 1 in. from the edges, fix in a pair of clams in a vice, and bend at right angles. Now cut two pieces same shape and depth as Fig. 1, but 2 in. less in width, as they have not to be bent; these are the sides, and the front and back pieces have to be riveted to them, marking the holes from the pieces just punched. Next turn four angle pieces of ¾ in. by ¼ in., and rivet two on each side to support the bottom—the bottom should come an inch below the hole, B. Next make the apron piece, Fig. 2, and rivet it on the front of the body, to support the irons, etc. Then make a short piece of 4 in. pipe, and throw off a flange on it, and rivet on the back, for the smoke pipe to fix on; cut out the top ½ in. larger all round than the body, and in it cut a hole 6½ in. or 7 in. diameter; carefully make the holes for the tenon pieces, and after placing the grating for the bottom in its place, rivet on the top by means of the tenons, unless you decide to use the angle pieces and stove screw, which, I think, is the best way if you have the tools, as the top could be easily removed if wanted. The next thing is the cover. I should, for this, turn a ring of ½ in.



Sheet Iron Stove Pieces.

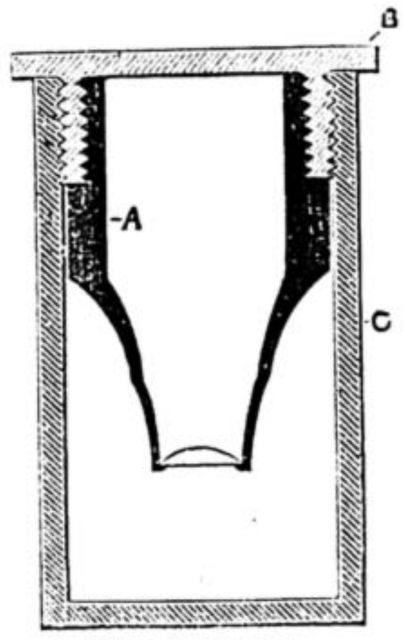
square iron that would just fit in the hole in the top, and rivet it to a round plate cut a little larger than the hole; rivet an eye or something to lift the cover for putting on fuel, and the stove will be complete, and although not perhaps so satisfactory as a proper cast iron one, I think it will answer your purpose. The dimensions I have given you can vary to suit your own convenience, and hope you will succeed in making it.—R. A.

Chemical Action in Gassner Battery.—H. H. L. (*Chester*).—I am not myself certain respecting the reaction which takes place in a Gassner battery when the circuit is closed. The constituents are (I am informed):—Zn + Zn Cl + Ca SO_4 + Zn O + H_2 O + C, but I do not know in what proportions they are present, as I have not analysed the contents of a Gassner cell. Zinc chloride is a far more deliquescent salt than ammonium chloride, hence its superiority in a so-called dry battery, since it absorbs and retains the moisture necessary to keep the battery in working order.—G. E. B.

Switch for Bell.—IRON TURNER (*Bolton*).—As your question respecting the construction of the switch and its connections is fully answered in my reply to ONE IN NEED (*Coventry*), I must respectfully refer you to that reply. The switch could be used as you suggest instead of an ordinary push to keep a bell ringing for a long time. All letters received by me receive prompt attention, and are registered, so cannot be forgotten. But there is such a crowd waiting at the printing office! All cannot be served at once, and each are admitted in turn.—G. E. B.

Book on Masts.—J. W. (*Plymouth*).—The following book may answer your purpose:—"Masting, Mast-making, and Rigging of Ships," by Ripping, 2s. 6d., Lockwood & Co.—F. J. C.

Microscope Object-Glasses.—OLD SCOTCH AMATEUR writes a very encouraging letter to the effect that, from the drawings and description given in WORK, he has made a microscope, and that it is a very handsome instrument. He calls himself an old smith, and says that during the last six months he has made a lathe, and that with the aid of this he has made his microscope. Such a letter as the OLD SCOTCH AMATEUR writes is encouraging, not only for those who desire to work, but also to those who, from time to time, endeavour to assist them to do so. In reply to his questions in reference to the cell for object-glass, I will say that each object-glass is fitted into its own cell; so that if he has, say, a 2-in., 1-in., and ½-in. power, they must be mounted in separate cells to fit into K, Fig. 1, No. 22. I would suggest to O. S. A. that he make a brass box to receive each of the cells; thus, procure a piece of brass tubing, of a size that when an internal thread is cut in it, it will allow the cell to screw into it. Cut off ½ in. in the lathe, and to the end that has not the thread solder a stout piece of brass, a little larger than the ring. Place it on a chuck and turn down the disc, and finish by milling the edge. On the outside of the ring cut another thread: this is to screw like a lid into a box. Take 2 in. of tubing, of a size to take the lid when a thread is chased on it. The other end is closed with a disc. When the object-glass is not in use, screw it into the lid and the lid into the box. It will thus be safe against dust and bad usage. The above sketch will make this matter quite clear. A is the cell of object-glass screwed into B; C is the cover of box. The sketch is not drawn to scale.—O.B. P.S.—Will O. S. A. explain what he means by a "small pair of chops, which he finds the handiest tool belonging to the lathe?" Personally, I should be glad to know; perhaps others, also, would be benefited by the information.



Object-Glass.

Coil with Three Powers.—ELECTRIC LUBRICATOR (*Manchester*).—As you know how to make induction coils, I can soon tell you how to arrange the three powers. When winding on the secondary, wind on enough for the first power, then bring the finish end of this out to a stud on the base board. To this same stud connect the starting end of the second power, wind it on the coil, and bring its finish end out to another stud on the base board. Start from this stud to wind on the wire for the third power, and carry its finish end to a third stud. These studs may be separate binding posts, or simply large round-headed brass studs, arranged in part of the radius of a circle within reach of the arm of a switch. Connect the handles of the shocking coil to the binding post at the commencement of the first power and to the pivot pillar of the switch arm. When the arm rests on the stud of the first power, the shock will be mild, when it is moved to the second stud the shock will be medium, and when moved to the third stud it will be strong, because then the effects of the whole three powers will be combined in one. A sketch will not be needed, and we cannot spare space for unnecessary engravings.—G. E. B.

Electrical Lantern.—A. O. A. (*Plaistow*).—I am now writing a series of articles on Model Electric Lights. When these appear you will see that it is impracticable to do as you suggest. The generator itself for an electric lamp could not be put "in a hand lantern to be carried about," whilst the sloppy, dirty battery, would, in any size or weight, be an intolerable nuisance. The light from such small electric lamps would be useless in a lantern, as it would not be equal to that of a rushlight.—G. E. B.

Circular Louvre Lights.—DIDO (*Buckland*).—I fail to glean from your short note what it is you exactly require. Are the louvres to be glass, wood, or glazed? Do you wish them to be movable? Are they to be circular on plan or elevation? What purpose are they for? Have you any particular stipulations in the way of construction, etc.? If you will send a sketch (no matter how rough) with approximate sizes, you will prevent me giving a description which might be a very long way from meeting your requirements.—E. D.

Battery for Alarums.—J. C. (*Coatbridge*).—You should have had three cells at least, arranged in series, to work six alarums through 100 feet of wire. You do not say how long it is since you set up the first cell, but it is clear to me that the cause of failure lies in the resistance offered by the first partly worn-out cell. When you added another cell, you supplied enough pushing power to overcome the resistance of the first cell, but now this second cell has lost its youthful vigour, and adds its resistance or dead weight to the circuit. I advise you to discard both old cells, and set up three new ones, to make a creditable job. You do not say what kind or size of wire you have used inside. If No. 18 or 20 copper wire properly insulated with double cotton covering and properly stapled, it will do. The underground wires should have been run through a gas pipe, or else covered with tarred

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tape to protect the gutta-percha covering. Always provide more than enough battery power, as this is the truest economy. I shall be pleased to advise you at any time.—G. E. B.

Photographing on Wood.—WOOD ENGRAVER (*Birmingham*).—I would point out that the description you give of the process is evidently far from correct, nor have I any idea as to what is intended, unless it be the dusting-on process. It, however, appears to me that the method is a more lengthy one than that described in my article on photographing on wood, which you consider would take up too much time to be of financial value. If WOOD ENGRAVER wants a cheap process, he cannot do better than coat his blocks over with salts of iron as used for blue printing (already described in WORK) and for copying plans, etc. The block, after being exposed under the negative, is sponged with water, and a blue picture appears. I remember my father making all the illustrations for "Science at Home," of which he was the author, by this means. —W. E. W.

Model Slot Machine.—CLAUDIAN (*Nottingham*).—(1) You require no power to drive the machine, the weight of the penny does all the driving that is necessary, unless your machine is to do some kind of work of which you do not inform me. In the chocolate and similar machines, the dropping of the coin releases a catch, and the weight of the material above does the rest of the work. If you will send particulars of the purpose to which you propose to apply the machine, I will give you full information as to its construction. (2) In French polishing you do not need to soak the surface to be polished; let it be made perfectly smooth with the finest glass-paper, then dust off with a linen duster, and leave the work in a room where no dust will settle on it. Then brush it over with a weak solution of white shellac in spirits of wine, being careful that no damp strikes it. When dry pass over a linen pad moistened with pure olive oil; then polish with French polish on a pad of linen over chamois leather, working only about one square inch at a time, and finish off with a fine silk rubber. Some of the old-fashioned French polishers used the ball of the thumb to finish.—F. C.

Plate Shelf.—SIGNALMAN (*Bebington*).—An article describing the construction of plate shelves is in the Editor's hands, and is awaiting its turn for publication. Your former question was received and answered in due course, but it is quite impossible for replies to appear immediately they are written, for all must take their turn. You may be sure that all inquirers are answered as soon as practicable. Pray do not think you are "too young a subscriber" to receive attention, for we want to encourage all workers, whether young or old. Pleased to hear of your increasing interest in WORK.—D. A.

Harp, Design for.—AMATEUR.—This cannot be treated in "Shop." The harp proper is far too complicated an instrument to be dealt with in a brief paragraph. Perhaps some reader will describe, and give a sketch of, a Welsh harp.

Model for Papier-Mâché.—H. G. N. (*Islington*) requires an egg-shaped core, 3 ft. in length, on which to paste papier-mâché. Models for pasting used in the trade are commonly of American ash, but any wood which will stand well will answer the purpose. H. G. N. can either make his core, or have it made, by gluing pieces of wood roughly to the shape and then using the lathe; or, more easily and cheaply, he can turn it from a solid block of beech-wood. The objection to this would be its weight; but it might be made in two or three pieces, turned hollow, and then glued together. The turners of wooden bowls at Berkhampstead and Chesham would readily make him a core in this way. They make their beech-wood stand by boiling it.—S. W.

Tin Pattern Covers.—G. B. (*Manchester*).—Personally I do not know the articles you speak of as bevel wheel guards, and cannot find them in any book. Could you give fuller descriptions of them, with dimensions and a sketch showing them both flat and made up? I might then be able to tell you the best way to get the patterns.—R. A.

Self-acting Blowpipes, etc.—W. F. (*Woolwich*).—The lamp, Fig. 14, is sold by Rhodes & Sons, Wakefield, and, writing from memory, the price is, I believe, 10s. 6d. The Paquelin lamp is 12s. There is no book that gives the prices for doing such jobs as you speak of, and it would hardly be right for me to lay down a standard of prices in WORK; but if you let the Editor have your address, I will write you out a list of prices for a number of simple jobs, what I consider a fair price, and forward it to you, with the Editor's permission.—R. A.

Working Models.—J. H. P. (*Dewsbury*).—I do not know of any catalogue of working models being issued.—F. C.

Audiophone.—DAKER (*Camberwell*).—This instrument is a very simple affair, and is, I believe, the invention of an American called Rhodes, who is, or was, himself deaf. About seven or eight years ago it was introduced to this country through the agency of a Glasgow merchant (whose address unfortunately I am not able to give). The American audiophone consists of a thin elastic sheet or plate of vulcanite, provided with a handle about the size and shape of a Japanese or palm leaf fan. To the upper edge a series of strings is fastened, and these are brought down to the handle, where they are held by a small clamp. These strings bend the plate into a semi-circular form. When the instrument is thus strained into shape it is pressed tightly against the upper front teeth by the deaf person, who holds the instrument in its position by the handle, the rounded side of course being turned outwards. The sounds received upon it cause it to vibrate after the manner of the face of a violin, or the sounding-board of a piano, and these vibrations are thus conveyed through the teeth and bones of the skull to the auditory nerves. Fig. 1 shows the instrument in section, and the method of holding it against the teeth. Fig. 2 is an inside view. The strings are shown unstrained, and the position of the strings are not of importance, provided they give the proper degree of curvature to the plate. So much for the American instrument. It was very costly, owing to the material of which it was made. After its invention it was greatly experimented upon, with a view to find out some material to substitute for the costly vulcanite—sheet metal, wood veneer, cardboard, even paper, all of which produced most wonderful results, some of them producing results far superior to the original material. Indeed, anything of a vibrating nature, providing the form of it has sufficient surface

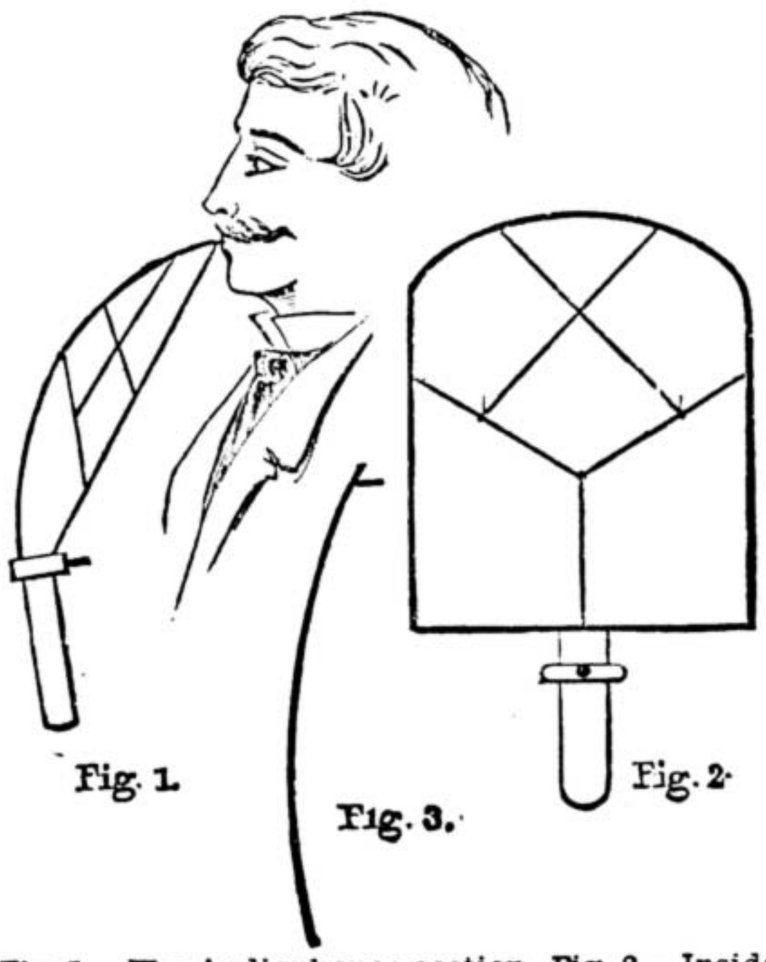

Fig. 1.—The Audiophone: section. Fig. 2.—Inside View. Fig. 3.—Fletcher's Audiophone in Section.

exposed to the source of sound, seems to answer the purpose. This I have found out by actual experiment. I will not occupy space here by giving details of the various contrivances I have made use of. Although the experiments always seemed satisfactory to myself (being possessed of a normal sense of hearing), they might not seem quite so much so to a partly-deaf person. I cannot do better, however, than describe the audiophone made by Thos. Fletcher, of Warrington. It consists of a piece of birch-wood veneer cut oval 12 in. by 8½ in. bent like Fig. 3. The bending is accomplished by steaming it and tacking it down upon a curved board, and keeping it in this position until it is perfectly set. It should then be varnished with shellac varnish, to which a little ivory black has been added, or it may be decorated to suit the fancy of the person who uses it. This being very light it can be held between the teeth without any effort. If the querist makes this, which will cost only a few pence, he will find it to answer much better than the American instrument already described, and he will, therefore, not require the address of the Audiophone Company, which I am sorry I cannot give.—W. D.

Bent Iron Designs.—TIM BOBBIN.—Try B. Bradley, 180, Fulham Road, West Brompton. You can get iron there, and probably designs; if not the latter, I will, with Editor's permission, send an article, with illustrated designs, to WORK.—J.

Iron Strips.—J. P. S. (*Hertford*).—You will probably get these of B. Bradley, 180, Fulham Road, West Brompton.

Wooden Printing Press.—FAUST (*Liverpool*).—I have in my hands a paper on the mode of making a wooden printing press, which will appear shortly.

V.—BRIEF ACKNOWLEDGMENTS.

Questions have been received from the following correspondents, and answers only await space in SHOP, upon which there is great pressure:—DOUBT (*Glasgow*); E. W. (*Hurstpierpoint*); R. T. (*Edinburgh*); F. H. H. (*Wednesbury*); S. B. (*Exmouth*); T. B. (*Sunderland*); M R. (*Burnley*); CLERICUS SECUNDUS; A. R. (*Scorrier Saw Mills*); J. K. (*Nottingham*); J. W. H. (*Holywood*); KEYNSHAM; W. K. (*New Wortley*); W. B. (*Glasgow*); R. W. (*Newcastle*); L. (*Liverpool*); F. T. B. (*Slade*); C. H. (*Bloomsbury*); NO NAME (*Reading*); STICKPHASTE; A. F. (*Hamilton*); A. F. (*Bath*); F. N. K.; W. J. (*Belfast*); R. O. B. (*Edinburgh*); G. F. H. (*South Lambeth*); FAIR PLAY; W. P. (*Blackburn*); G. S. (*Fulham*); C. H. C. (*Cheltenham*); A. J. B. (*Peckham*); LITTLE SCOT; T. B. (*Swanley*); J. S. W. (*Glasgow*); CINQUE PORT; A. H. (*Arlington Square*); A. H. W. (*Newcastle-on-Tyne*); D. W. T. (*Sydenham, S.E.*); A. H. (*London, N.W.*); H. M. B. (*Wakefield*); H. S. (*Clapham Junction*); R. W. B. (*Poplar*); ONE IN THE DARK; J. H. (*Heaton*); ALIQUANDO; T. K. (*Glasgow*); J. C. (*Newcastle-on-Tyne*); J. H. S. (*Wigan*); and H. G. (*Liverpool*).

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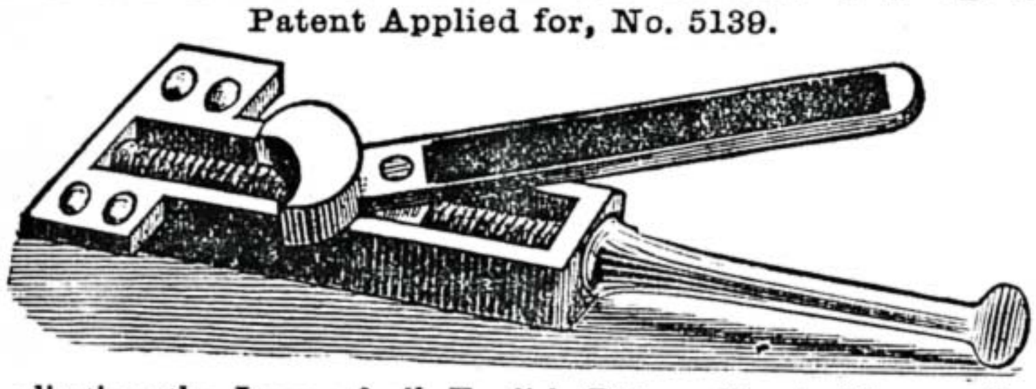

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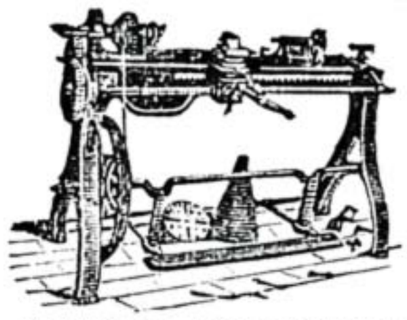

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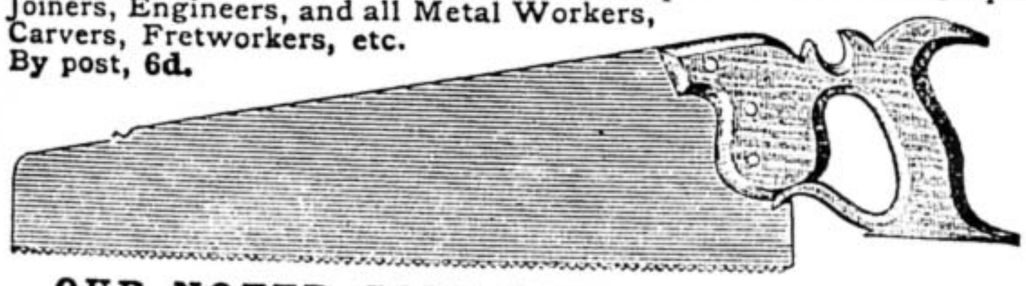

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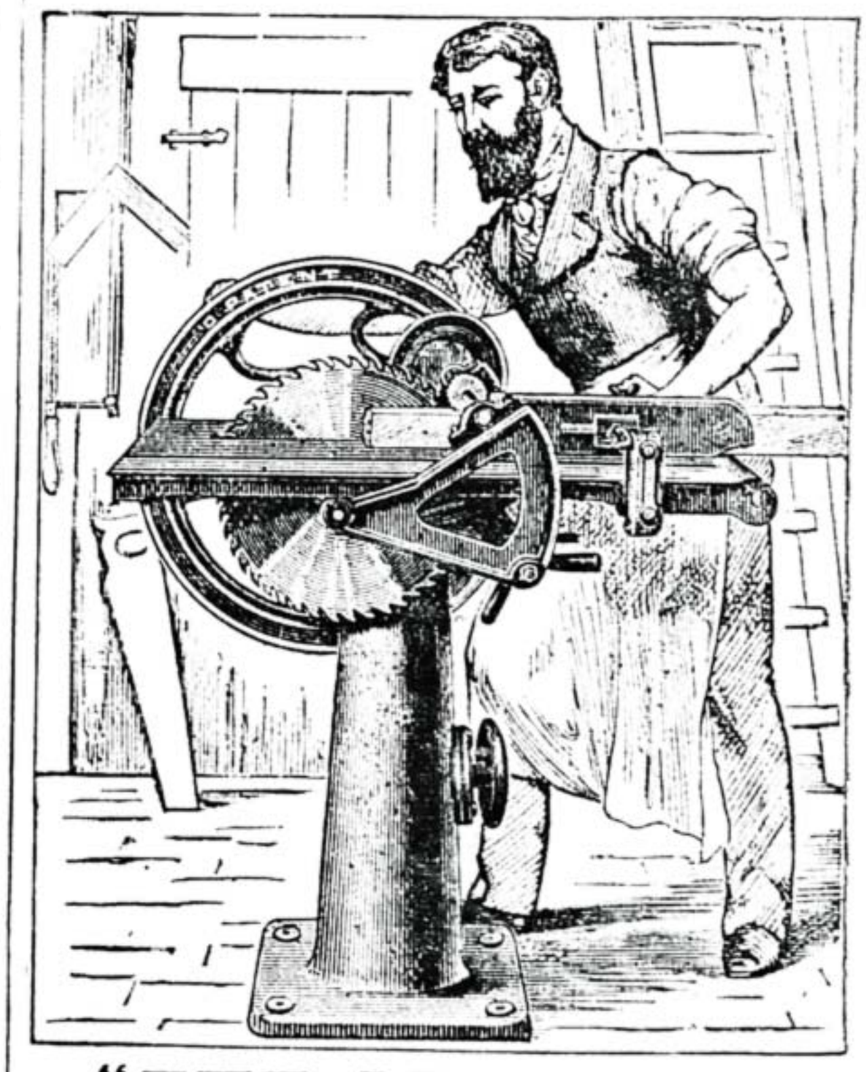

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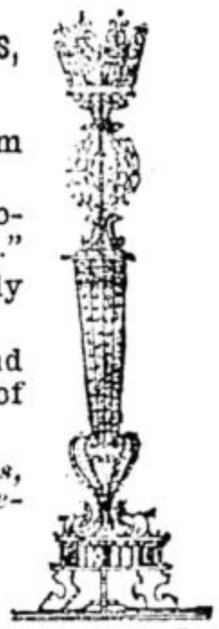

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